Phase I Environmental Site Assessment of
Tronox LLC
Clark County, Nevada

Prepared for:

LePetomane XXVII, Inc.
Chicago, Illinois

Prepared by:
ENVIRON International Corporation
Emeryville, California

Date:
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Project Number:
21-26210A

Signature and Environmental Professional Statement

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312.

Further, we have the specific qualifications based on education, training, and experience to assess a property of the nature, history and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

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Nevada Environmental Manager Certification

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statues, regulations and ordinances.

Wendy Seider

January 20, 2010
Date

Wendy Seider
Certified Environmental Manager
Certificate Number: 2102
Expiration Date: October 18, 2013

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1 Summary of Conclusions

ENVIRON International Corporation (ENVIRON) was retained by LePetomane XXVII, Inc. to perform a Phase I Environmental Site Assessment (ESA) of the Tronox LLC (Tronox or the "Company") property located in Clark County, Nevada (herein referred to as the "facility" or the "site"). ENVIRON's assessment was conducted in connection with the transfer of the site to the custody of an environmental response trust. The ESA described in this report was performed in conformance with the scope and limitations of the ASTM International's *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* E-1527-05 (the "ASTM Standard"), as stated in Chapter 2.0 (Introduction). Any exceptions to, or deletions from, this practice are described in Section 6.3 of this report.

1.1 Recognized Environmental Conditions

ENVIRON identified the following "recognized environmental conditions" (RECs), as defined by ASTM (see Chapter 2.0), in connection with the property:

- **Identified On-Site Contamination Related to Historical Site Operations.** As detailed in Section 4.3 of this report, past site operations have resulted in adverse impacts to site groundwater, soil, and soil gas. Contamination originating on the subject property has also impacted off-site groundwater in a downgradient direction and downstream surface water bodies. The identified contamination is being addressed under the oversight of the Nevada Division of Environmental Protection (NDEP).

  With respect to groundwater, the primary constituents of concern are hexavalent chromium and perchlorate. Tronox is currently employing several on-site and downgradient groundwater extraction and treatment systems (as well as use of a slurry wall) to address the contaminant plume originating on-site. These remedial technologies have resulted in significant decreases in contaminant migration to downgradient and downstream receptors, although contaminant levels remain above established regulatory standards. Currently, Tronox is evaluating enhancements to the active groundwater remediation systems.

  Past site investigations have identified a number of constituents in site soils above regulatory standards, including dioxin, hexachlorobenzene, other semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), asbestos, metals, organochlorine pesticides (OCPs), and perchlorate. In 2010, Tronox undertook a remediation program to excavate source areas present within the top ten feet of soil in five remediation zones encompassing most of the current and former operating areas of the site. This source area remediation effort is still underway. Where potentially impacted soils within the remediation zones cannot be investigated and/or excavated due to Tronox's operations at the site (e.g., beneath the active Unit Buildings and the Leach Plant), further actions will likely not be required so long as the facility remains operational. Tronox is in the process of implementing Institutional Controls/ Environmental Covenants to prevent exposure to residual contaminants in certain areas originally designated for excavation where, due to physical constraints or other access issues, residual contamination may remain in place. Tronox is also evaluating the feasibility of *in situ* soil remediation technologies to address residual perchlorate contamination in the deeper portions of the vadose zone in some of

these areas. In addition, on-site soils along the northern, western, and southern edges of the site (outside the boundaries of the aforementioned remediation zones) are being investigated and remediated by several other entities separately from Tronox's investigations.

Site-wide evaluations of soil gas recently performed in 2008 through 2010 identified elevated concentrations of volatile organic compounds (VOCs) within specific areas of the site that present a potential indoor air risk in excess of NDEP's "point of departure" risk levels. As such, risk management activities may be needed for existing buildings and future construction to mitigate vapor intrusion concerns.

The identified impacts to on-site groundwater, soil, and soil gas related to historical site operations represent a Recognized Environmental Condition.

- **Identified On-Site Contamination from an Off-Site Source.** A groundwater contaminant plume (primarily chlorinated VOCs, pesticides, and metals) has migrated onto the subject site from the adjacent property to the west. The responsible parties for this groundwater plume are operating a groundwater treatment system and performing groundwater monitoring under NDEP oversight, but dense non-aqueous phase liquid (DNAPL) and significant concentrations of dissolved-phase contaminants remain present beneath the Tronox site. The contamination originating from off-site may be contributing to the on-site vapor intrusion concerns described above. Additional information regarding on-site contamination associated with off-site sources is presented in Section 4.3 of this report. The presence of subsurface contamination originating from off-site sources represents a Recognized Environmental Condition.
- **Closure of On-Site Surface Impoundment AP-5.** Pursuant to an Administrative Order on Consent entered into between NDEP and Tronox's predecessor company (Kerr McGee Chemical LLC) in April 2005, Tronox is required to decommission on-site surface impoundment AP-5. The approximately 10.9-acre, lined impoundment was historically used to contain ammonium perchlorate-containing solutions. Decommissioning activities are planned for 2011, which will involve dewatering the pond (with effluent discharged to a different on-site surface impoundment), removing the solids for off-site disposal (following dewatering), and excavation of the underlying liner. During this process, any identified contamination underlying the pond would also be addressed in accordance with NDEP requirements. Given that AP-5 decommissioning activities are being required by NDEP to avert any further threat of a release of perchlorate to the environment, ENVIRON considers this matter to represent a Recognized Environmental Condition until decommissioning activities are completed.

Because all of the Recognized Environmental Conditions identified above are currently known to NDEP and are actively being investigated and addressed under the Division's oversight, ENVIRON does not recommend additional investigation or remedial actions separate and apart from the ongoing activities described above at this time.

1.2 Historical Recognized Environmental Conditions

In addition to the RECs described above, ENVIRON identified the following issue that has been addressed to the satisfaction or regulatory authorities and therefore is not considered a current REC:

- **Sale Parcels A and B.** As detailed in Section 4.3 of this report, the northern, western, and southern edges of the site, which are not within the boundaries of the aforementioned remediation zones, have been designated as Sale Parcels A through J. Investigation and (as needed) remediation of the Sale Parcels is being performed by several entities on a separate timeline from the ongoing activities in the remediation zones. In correspondence dated April 8, 2008, NDEP issued a No Further Action letter for Parcels A and B, and no additional investigation or remediation activities are planned for these areas. As such, Sale Parcels A and B are no longer considered to represent a REC.

1.3 *De Minimis* Conditions

De minimis conditions are those that do not represent a material risk of harm to public health or the environment and that generally would not be the subject of enforcement action if brought to the attention of appropriate governmental agencies. During ENVIRON's site tour and prior environmental assessments, stained flooring, pavement, and soil were observed at the site, as would typically be expected for a facility used for heavy industrial activities over the course of nearly seventy years. In addition, current and past site operations have involved use of various chemicals and features (e.g., sumps, underground lines, tanks) that could potentially result in subsurface contamination. Areas of significant environmental concern throughout the site are being addressed by Tronox and/or other entities under NDEP oversight, as described in Section 1.1 above. Those limited portions of the site that are not the subject of further investigation and/or remediation under the framework described above are considered to be *de minimis* concerns.

2 Introduction

2.1 Purpose

ENVIRON was retained by LePetomane XXVII, Inc. to conduct a Phase I ESA of the Tronox facility located in Clark County, Nevada. ENVIRON's assessment was conducted in connection with the transfer of the site to the custody of an environmental response trust. The purpose of the assessment was to identify RECs, which are defined in the ASTM Standard as:

> "The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* are not recognized environmental conditions."

2.2 Scope of the Assessment

ENVIRON completed the following tasks, consistent with the ASTM Standard, during its Phase I ESA of the property:

- A visit to the site by Allan DeLorme of ENVIRON on December 14, 2010 to observe the exterior and interior features of the site and to identify the uses and conditions specified in the ASTM Standard. In addition, ENVIRON observed the adjoining properties from the site or adjacent public thoroughfares.
- Interviews during the site visit with the following site employees: Susan Crowley of Crowley Environmental LLC , who has been associated with the site since 1985; and Keith Bailey of Environmental Answers LLC, who formerly served as Director, Waste Minimization – Safety & Environmental Affairs for Tronox. The aforementioned employees, both of whom currently serve as independent contractors to Tronox, are referred to herein as "facility personnel". The facility personnel interviewed by ENVIRON were identified by Tronox as having good knowledge of the uses and physical characteristics of the site consistent with the definition of a key site manager in the ASTM Standard.
- A review of a search of environmental regulatory agency database records conducted by Environmental Data Resources, Inc. (EDR) in December 2010 for the site and off-site properties in the vicinity of the site. A copy of the EDR radius report is included as Appendix A. The databases and the radius searched for each database were selected in accordance with the ASTM Standard and are identified in the EDR database report. The dates of the most recent updates of the environmental databases are also listed in the database report.
- A review of standard historical sources (included as Appendix B) and local agency inquiries, as defined in the ASTM Standard. The following resources were reviewed:

  - Readily available historical sources, including (where available) historical topographic maps and aerial photographs, city directories, and Sanborn Maps, to develop a history of the previous uses of the site and surrounding area.
  - Historical and site-specific information obtained from the following local agencies: the Clark County Assessor's Office (Assessor) and Clark County Development Services (Building Department). ENVIRON also obtained information related to septic systems at the site from the Southern Nevada Health District (Health Department) and has repeatedly requested but not yet received information related to underground storage tanks (USTs).
  - A request for hazardous material-related information from the City of Henderson Fire Department and the Clark County Fire Department. The City of Henderson Fire Department reported that the subject property is not within its jurisdiction, but rather is within the jurisdiction of the Clark County Fire Department. The Clark County Fire Department has not responded to ENVIRON's repeated information requests.
  - Review of environmental reports related to the site obtained from the Nevada Division of Environmental Protection (NDEP).
- A review of physical setting sources, as defined in the ASTM Standard, including:
  - The current USGS 7.5-minute topographic map that shows the area on which the site is located.
  - Geologic, hydrogeologic, or hydrologic sources as provided in the EDR report and in the previous environmental reports for the site, as described below.
- A review of documents provided to ENVIRON by facility personnel, including Company-prepared plans and procedures, environmental permits, correspondence with regulatory agencies, and environmental reports related to the site. Although ENVIRON reviewed several dozen environmental reports as part of this Phase I ESA, the key environmental reports (included as Appendix C) and regulatory orders primarily relied upon are listed below:
  - *Consent Order*, entered into by NDEP and Kerr McGee Chemical Corporation, dated September 9, 1986;
  - *Consent Agreement,* entered into between NDEP and Chemstar, Inc., Kerr-McGee Chemical Corporation, Montrose Chemical Corporation of California, Inc., Pioneer Chlor Alkali Company, Inc., Stauffer Management Company, Inc., and Titanium Metals Corporation, dated April 25, 1991;
  - *Environmental Conditions Assessment, Kerr-McGee Chemical Corporation, Henderson, Nevada Facility*, prepared by Kleinfelder, Inc., dated April 1993 (the "ECA report");
  - *Phase II Letter of Understanding Between NDEP and Kerr-McGee Chemical Corporation (KMCC)*, prepared by NDEP, dated August 15, 1994 (the "LOU");

- *Consent Agreement*, entered into between NDEP and Kerr-McGee Chemical Corp., dated August 12, 1996;
- *Consent Agreement,* entered into between NDEP and Kerr-McGee Chemical LLC, dated July 26, 1999;
- *Administrative Order on Consent*, entered into between NDEP and Kerr-McGee Chemical LLC, dated October 8, 2001;
- *Conceptual Site Model, Kerr-McGee Facility, Henderson, Nevada,* prepared by ENSR International, dated February 2005 (the "Conceptual Site Model" report);
- *Administrative Order on Consent,* entered into between NDEP and Kerr-McGee Chemical LLC, dated April 12, 2005;
- *Order,* issued by NDEP, dated December 14, 2009;
- *Removal Action Work Plan for Phase B Soil Remediation of Remediation Zones RZ-B through RZ-E, Tronox LLC, Henderson, Nevada*, prepared by Northgate Environmental Management, Inc., dated June 22, 2010;
- *2010 Comprehensive Groundwater Data Evaluation Report, Former Montrose and Stauffer Facilities, Henderson, Nevada, Revision 1.0*, prepared by Hargis + Associates, Inc. (Hargis), dated September 21, 2010;
- *Site-Wide Soil Gas Human Health Risk Assessment, Tronox LLC, Henderson, Nevada*, prepared by Northgate Environmental Management, Inc. and Exponent, Inc., dated November 22, 2010; and
- *Closure and Post-Remediation Screening Health Risk Assessment Report for Parcels C, D, F, G, and H, Tronox LLC, Henderson, Nevada*, prepared by Northgate Environmental Management, Inc. and Exponent, Inc., dated December 10, 2010.

Because the site has been extensively investigated under the purview of the NDEP since the 1980s, it was determined that only duplicative information would be provided in a User Questionnaire consistent with Appendix X3 of the ASTM Standard. Therefore, a User Questionnaire was not prepared as part of this assessment.

This assessment was conducted in accordance with ASTM Standard E1527-05, as agreed upon by ENVIRON and LePetomane XXVII in December 2010. Certain "non-scope considerations," as defined in the ASTM Standard (i.e., asbestos-containing materials [ACM], radon, lead-based paint, lead in drinking water, wetlands, regulatory compliance, cultural and historic resources, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality, and high voltage power lines) are not addressed in this Phase I ESA. In addition, ENVIRON's scope of work did not include a vapor intrusion assessment in accordance with ASTM E2600-10.

2.3 Significant Assumptions

In conducting this review, no significant assumptions were made, except for the following:

- ENVIRON's evaluation of potential on-site impacts from off-site sources is based on the assumption that a hazardous material released to the subsurface generally does not migrate laterally within the unsaturated soil for a significant distance, although a hazardous material can migrate in the groundwater in a generally downgradient direction. There are, however, limits to this interpretation.

2.4 Reliance and General Limitations

This environmental review has been prepared exclusively for use by LePetomane XXVII, Inc., its counsel, and such other persons or entities whose reliance is explicitly authorized in writing by ENVIRON.

The report is considered current only for a period of 180 days from the site inspection. The conclusions presented in this report represent ENVIRON's best professional judgment based upon the information available and conditions existing as of the date of the review. In performing its assignment, ENVIRON must rely upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to ENVIRON was accurate and complete. This review is not intended as legal advice, nor is it an exhaustive review of site conditions or facility compliance. ENVIRON makes no representations or warranties, express or implied, about the conditions of the site.

ENVIRON's scope of work for this assignment did not include collecting samples of any environmental media. As such, this review cannot rule out the existence of latent conditions, and is intended, consistent with normal standards of practice and care, to assist the client in identifying the risks of such conditions.

3 Site Description

3.1 Site Setting

Tronox owns and operates a facility for the manufacture of elemental boron, boron trichloride, and manganese dioxide located in unincorporated Clark County, Nevada (the "site" or the "facility"). The approximately 450-acre site is located approximately 13 miles southeast of the City of Las Vegas (Figure 1). The site is located within the Black Mountain Industrial (BMI) Complex, an industrial area operated by a variety of chemical companies since the early 1940s (Figure 2). While the BMI Complex is located within unincorporated Clark County, it is surrounded by the City of Henderson on all sides.

As depicted in Figure 3, the six main buildings present on-site (known as Units 1 through 6) are aligned in a row extending in a west-east direction across the center of the site. These buildings were constructed during World War II for magnesium production. Tronox currently uses Units 5 and 6 for production of manganese dioxide, and Unit 5 is also used for storage. Units 1, 2, and 4 are no longer used and have been partially demolished. Tronox currently uses Unit 3 for office and storage activities. In addition, Tronox produces boron products within a Boron Plant to the north of Unit 4, and production of manganese sulfate solution (for use in the manganese dioxide production process) is performed within a Leach Plant north of Units 5 and 6. Other buildings present on-site include an administration building, a change house, a laboratory building, a maintenance shop, a steam plant, and various storage buildings.

The site is generally rectangular, but certain interior portions of the rectangle have been carved out for use by other companies, such as Chemstar (a lime producer), Titanium Metals Corp (Timet), and the Western Area Power Administration (WAPA). An area within the northwestern portion of the subject site consists of Tronox's groundwater treatment facilities, which are operated by an outside contractor, Veolia Water North America (Veolia).

Four lined ponds on the site (known as WC-West, WC-East, Mn-1, and AP-5) contain process-related wastewater, and an additional lined pond (known as GW-11) collects extracted groundwater from remediation activities. Two additional lined surface impoundments (known as Mn-1 and AP-5) contain process-related wastewaters. In addition, the site is traversed (from west to east) by a drainage ditch known as the Beta Ditch that historically conveyed liquid wastes from the site (and other sites in the area); the Beta Ditch is currently blocked by an earthen dam near the eastern end.

Table 1 provides an overview of physical setting and utility information for the site.

Table 1: Physical Setting and Utility Information

Conditions	Source	Description
Topography		
Elevation (above mean sea level)	Prior environmental reports	Ranges from 1,677 to 1,873 feet

Table 1: Physical Setting and Utility Information		
Conditions	**Source**	**Description**
Topographic Gradient	Prior environmental reports; Visual observations	Relatively flat on-site, with a gentle downward slope to the north. The developed portions of the site have been modified by grading to accommodate building foundations, surface impoundments, and access roads. Topography of the site has also been influenced by the extensive excavation program currently in progress at the site pursuant to NDEP Orders. Regional topography slopes gently downward to the north toward Las Vegas Wash.
Hydrology		
Surface Water Runoff	Visual observations	Percolates into the ground surface at unpaved areas and/or enters drainage channels that ultimately discharge to Las Vegas Wash.
Nearest Surface Water Body	USGS topographic map; Visual observations	There are various ponds, creeks, ditches, and impoundments on and in the immediate vicinity of the site. The nearest major surface water body is Las Vegas Wash, a tributary of Lake Mead located approximately three miles north of the site.
Flood Plain	FEMA*	Portions of the site along Lake Mead Drive and near the Beta Ditch are located within the 100-year flood zone.
Wetlands	NWI*	The EDR report does not include wetlands information for the site location.
Geology and Hydrogeology		
Presumed Direction of Shallow Groundwater Flow	Prior environmental reports	Groundwater generally flows to the north-northeast across the site. The groundwater flow pattern is influenced by the presence of higher permeability paleochannels, acting as preferential conduits to flow and inflecting contours in an upgradient direction. Other localized influences on shallow zone groundwater flow include groundwater recovery well fields, the City of Henderson Bird Preserve Ponds, a constructed barrier wall, and recharge trenches (see Section 4.3).
Depth to Groundwater	Prior environmental reports	Depth to shallow groundwater ranges from approximately 27 to 80 feet below ground surface (bgs) and is generally deepest in the southernmost portion of the site. The middle water-bearing zone extends to approximately 300 feet bgs, and the deep water-bearing zone is generally encountered at 300 to 400 feet bgs.
On-site Wells	Facility personnel; Visual observations	Various monitoring and extraction wells are present on-site associated with identified groundwater contamination (see Section 4.3).
Nearest Groundwater Supply Wells	EDR database report	Several hundred federal USGS wells and state wells are present within one mile of the site in all directions. Many of the state wells are groundwater monitoring and extraction wells installed within and downgradient of the BMI Complex to address identified groundwater contamination.

Table 1: Physical Setting and Utility Information		
Conditions	**Source**	**Description**
Geologic Conditions	Prior environmental reports	The site is underlain by alluvial fan deposits (to a depth ranging from 13 feet to more than 50 feet bgs), consisting of a heterogeneous mixture of highly permeable, well-graded sand and gravel with lesser amounts of silt, clay and caliche, without continuous or distinct units. The alluvium is deposited on top of the Upper Muddy Creek Formation (to depths of more than 385 feet bgs), an older sedimentary formation consisting of at least two thicker units of fine-grained sediments of clay and silt interbedded with at least two thinner units of coarse-grained sediments of sand, silt, and gravel. Buried alluvial channels, or paleochannels, were eroded into the surface of the Muddy Creek Formation during infrequent flood runoff periods; these generally uniform sand and gravel deposits exhibit higher permeability than the adjacent well-graded deposits, and the paleochannels trend northeastward.
Site Utility Information		
Electricity Supplier	Facility personnel	Nevada Power Company
Natural Gas Supplier	Facility personnel	Southwest Gas
Use of Fuel Oil for Building Heat	Facility personnel	Currently used as backup fuel supply for the steam plant. Historical use is unknown, given the long history of the site
Water Supplier	Facility personnel; City of Henderson website	The City of Henderson, which obtains its water from Lake Mead (90%) and local groundwater sources in Las Vegas Valley (10%).
Sanitary Sewer	Facility personnel	City of Henderson
Septic Systems	Facility personnel; Health Department records; Prior environmental reports	Several septic systems have been used at the site. Information regarding these septic systems is presented in Section 5.2.14 below.

Notes:
FEMA = Federal Emergency Management Agency; NCCS = National Cooperative Soil Survey ; NWI = National Wetlands Inventory
* - Source was provided in the EDR database report.

3.2 Current Use of Property

Tronox owns and operates the site for the manufacture of elemental boron, boron trichloride, and manganese dioxide. Production of the boron products is performed within the Boron Plant located north of Unit 4. Manganese dioxide production is performed within Units 5 and 6, and manganese sulfate solution needed for the manganese dioxide process is produced in the Leach Plant located to the north of Units 5 and 6. Units 1, 2, and 4 are currently vacant, and Unit 3 is used for warehousing purposes only. Based on the information reviewed, the facility's current operations are described by Standard Industrial Classification (SIC) code 2819 (*Industrial Inorganic Chemicals, Not Elsewhere Classified*) and North American Industry Classification System (NAICS) code 325188 (*All Other Basic Inorganic Chemical*

Manufacturing). The major industrial processes performed by Tronox at the site are summarized below:

Production of Manganese Sulfate Solution

Within the Leach Plant, Tronox produces manganese sulfate solution that is required for manganese dioxide production (see description below). The process first involves calcining ground manganese ore in one of four open hearth furnaces (thereby reducing insoluble manganese dioxide to soluble manganese dioxide), slurrying the calcined ore into a thickener, and feeding the underflow of solids from the thickener into the leach tanks. In the leaching process, anolyte from the electrolysis cells and sulfuric acid are mixed with the ore slurry in the leach tanks and pumped to an acid thickener; the overflow from the thickener is used to slurry the calcined ore, and the underflow from the acid thickener is filtered and returned to the thickener. The manganese sulfate solution is then purified by adding hydrogen sulfide to precipitate out zinc, copper, cobalt, lead, and nickel as sulfides.

Raw materials used within the Leach Plant include manganese dioxide ore; coal, coke or natural gas; sulfuric acid; barium sulfide; diatomaceous earth; lime; hydrogen sulfide; and flocculent. The primary waste streams generated from the process include filter cake from the washing of leach acid underflow sludge and precipitated metals from the purification step; these waste streams (referred to as manganese tailings) were historically disposed at a permitted on-site nonhazardous tailings landfill (see Section 5.2.11) but are now sent off-site for disposal. The sludge generated from the manganese dioxide cathode washdown activity is sent to surface impoundment Mn-1 (see Section 5.2.9).

Manganese Dioxide Production

Within Units 5 and 6, Tronox processes manganese dioxide ore to produce a high purity manganese dioxide for use in dry cell batteries. This process has been performed on-site since 1951. In this process, purified manganese sulfate solution from the Leach Plant (see description above) is fed to the electrolytic cells in Units 5 and 6, where high purity manganese dioxide is plated out of solution. The cell solution is recycled back to the Leach Plant for reuse. The pure manganese dioxide is stripped from the titanium anode, crushed to pass through a sieve, and washed to remove residual manganese sulfate and sulfuric acid. The powdered manganese dioxide is then filtered, dried, and bagged for shipment.

Primary raw materials used in the process include manganese sulfate solution (from the Leach Plant) and paraffin wax. The primary waste streams generated include copper cathode wash solution (a sodium hexametaphosphate solution discharged to surface impoundment Mn-1) and product wash water (discharged to on-site wastewater collection ponds WC-East and WC-West). Product wash water collected in WC-East and WC-West is discharged to an on-site distillation process for purification and subsequently recycled back to the process water system.

Elemental Boron Production

The Boron Plant has been operational for production of elemental boron (used in automotive airbag igniters) since 1972. In this process, anhydrous boric acid and magnesium metal are blended, loaded into trays, and ignited within a reaction chamber in an argon atmosphere. The resulting product is ground in a crusher and transferred to a leaching tank containing sulfuric acid and water, in which magnesium oxide is leached from the elemental boron as magnesium sulfate. The contents of the leach tank are pumped to a filter for removal of boron cake. The boron cake is washed, dried, and milled in preparation for shipment.

Primary raw materials used in the process include boric acid, magnesium metal, argon, sulfuric acid, steam, and soda ash. The primary waste stream generated from the process is liquid filtrate, which is neutralized with soda ash and discharged to WC-East and WC-West.

Boron Trichloride Production

Boron trichloride (a gas at room temperature used in the pharmaceutical and semiconductor industries and in the manufacture of high-strength boron fibers) has been produced at the site since 1972/3, first in Unit 5 and more recently in the BCL Building. In this process, boron carbide is reacted with chlorine gas in one of five steel reactors. Boron trichloride gas is continuously removed from the reactor to a condenser, where it is air cooled to condense metal halides and oxychlorides. The boron trichloride exits the condenser through a screen filter and is fed into a crude distillation column for removal of unreacted/reacted chlorine gas and non-condensable gases. Liquid boron trichloride falls through the column to the crude reboiler where the boron trichloride liquid is vaporized and sent back through the distillation column. The boron trichloride is repeatedly and continuously condensed and vaporized for purification, with a portion of the boron trichloride removed from the bottom of the distillation column and fed to the refined reboiler and distillation column. The refined distillation column removes silicon (as silicon tetrachloride) from the boron trichloride. Again the boron trichloride is repeatedly condensed and passed through the refined distillation column for purification, with a portion transferred to the boron trichloride product receiver. Excess boron trichloride from the reactor and the refined distillation column is sent to a wet scrubber.

Primary raw materials used in the process include boron carbide and chlorine gas. Wastes generated in the process include carbon separated from the spent boron carbide ash at the bottom of the reactor vessel (sent to an off-site landfill), high boiling compounds (e.g., silicon tetrachloride) that collect in the reboilers (formerly flushed to surface impoundment C-1), scrubber liquid containing dissolved chlorine and chlorine gas (sent to the boron unit's cooling tower, with blowdown sent to surface impoundments), and halide wall solid waste and screen filter waste (formerly used to sluice the suspension to C-1).

Steam Plant Operations

Located approximately 1,320 feet north of Unit 4, the steam plant provides steam to all of Tronox's operations. The steam is mainly used for process heating and vacuum ejectors. Steam is generated using three boilers that burn natural gas (two have fuel oil as a backup fuel). Water used in the plant is de-aerated and softened (through both a heated process and an ion exchange resin bed), and limited amounts of water treatment chemicals are added. Wastewater generated from the steam plant (e.g., boiler blowdowns, backwash and regeneration water from the water softeners, sludge bed blowdown from the hot process softener, and miscellaneous pump seal flushes) are collected in an effluent tank and pumped to WC-East and WC-West.

Groundwater Treatment

Tronox maintains a groundwater treatment facility on the northern portion of the site that receives and treats extracted groundwater from several remediation systems (see Section 4.3). Operated by a contractor (Veolia), the system includes granular activated carbon for the treatment of pesticides and other organics; biological fluidized bed reactor (FBR) technology for the treatment of perchlorate, chlorate and nitrate; and a ferrous sulfate system for the chemical reduction of hexavalent chromium. A lined surface impoundment (GW-11) can be used to store the extracted groundwater prior to treatment. Following treatment, all extracted water is discharged to Las Vegas Wash under a National Pollutant Discharge Elimination System (NPDES) permit.

According to facility personnel, Tronox does not use any chlorinated solvents at the site. At the time of the 1993 Environmental Conditions Report (ECA), 1,1,1-trichloroethane (TCA) was used within several parts washer units, but this solvent use has reportedly since been discontinued. Information regarding historical chlorinated solvent usage at the site, beyond that which was presented in the ECA, is not reasonably ascertainable.

3.3 Current Uses of Adjoining Properties

The facility is located in an industrial land use area. The nearest residential areas are located just north (across North Boulder Highway) and south (across Lake Mead Parkway) of the site. Based on discussions with facility personnel, ENVIRON's visual observations from the property boundary and public rights-of-way, and a limited review of publicly available information, a general determination of the current use of adjacent properties was developed, as described Table 2.

Table 2: Current Use of Properties Adjacent to the Site

Direction	Property/Land Use	ENVIRON's Observations
North	Various industrial and commercial operations, then North Boulder Highway and residences	Significant industrial operations were observed throughout the other portions of the BMI Complex.
East	Titanium Metals Corp. (Timet)	
South	Lake Mead Parkway, various industrial and commercial operations, and residences	

Table 2: Current Use of Properties Adjacent to the Site		
Direction	**Property/Land Use**	**ENVIRON's Observations**
West	Chlor-alkali plant operated by Olin Corporation (Olin), including former Stauffer and Montrose sites; Basic Remediation Company Corrective Action Management Unit; and Montrose/Stauffer/Olin groundwater treatment system area	
Internal to the Tronox property	Properties operated by Timet, Chemstar, and Western Area Power Administration (WAPA)	

Notes:
Observations were made by ENVIRON during the site visit. ENVIRON walked or drove by the borders of these properties that are shared with the subject site. ENVIRON did not enter the neighboring properties and was therefore unable to observe the rear and sides of the properties.

4 Review of Public Records and Other Information Sources

4.1 Environmental Regulatory Database Review

ENVIRON contracted with EDR in December 2010 to prepare of summary of listings in federal and state agency databases for the site and facilities within applicable radii of the property, as specified by the ASTM standard.[1] A copy of the EDR report is presented in Appendix A.

4.1.1 Database Review for Site

According to the results of EDR's search, the property is listed on a number of databases searched by EDR, as discussed in Table 3.

Table 3: Summary of Environmental Database Listings for the Site

Listing Name or Address	Database	Comments	Reference for Further Discussion
Databases Potentially Indicative of Contamination Concerns			
Tronox LLC (8000 W Lake Mead Dr)	Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) No Further Remedial Action Planned (NFRAP)	The CERCLIS listing indicates that the site was brought to USEPA's attention in September 1979. Following preliminary assessments in May 1980 and July 1988, the site was assigned a low priority for further assessment. A site inspection was completed in March 1990, after which the site was designated with a NFRAP status.	Section 4.3
	Resource Conservation and Recovery Act (RCRA) Corrective Action Activities (CORRACTS)	Based on the CORRACTS listing, a RCRA Facility Assessment and a stabilization measures evaluation were completed at the site in 1987 and 1992, respectively. During this time period, the site was designated a medium corrective action priority. In 1997, the site was reassigned a high corrective action priority. More recent listings from 2004 and 2005 indicate that human exposures and migration of contaminated groundwater were considered under control. The most recent listing is from December 2006, which identifies the event as "date for remedy selection (CM imposed)."	Section 4.3
Jack B Kelley Inc (8000 West Lake Mead Dr)	Underground Storage Tank (UST), Corrective Action Case List (SHWS)	Jack B. Kelley, Inc. (a former lessee on the subject property) is listed on the UST database for a 600-gallon used oil UST installed in 1971 that is permanently out of use. This entity is also listed on the SHWS database for a release reported to NDEP in June 1991 and issued regulatory closure in May 1992.	Section 5.2.2

[1] EDR uses the term "radii" to refer to the ASTM terminology "approximate minimum search distance" in the environmental database report.

Table 3: Summary of Environmental Database Listings for the Site			
Listing Name or Address	**Database**	**Comments**	**Reference for Further Discussion**
Plancor 201-C	Formerly Used Defense Sites (FUDS)	The BMI Complex, in which the site is located, is listed on the FUDS database as a former army site. No additional information is included in the FUDS listing.	Section 4.3
Databases Related to Regulatory Compliance			
Tronox LLC (8000 W Lake Mead Dr)	RCRA Treatment, Storage and Disposal Facility (TSDF)	Tronox is listed on the RCRA database as engaged in the treatment, storage, or disposal of hazardous waste. The listing indicates that Tronox and Kerr-McGee (its predecessor company) have operated the facility since 1967. Based on the listing, the facility has been the subject of a number of state inspections related to TSDF requirements and received associated violations in October 1984 and September 1993. Compliance has been achieved for these past violations.	Sections 5.2.9 and 5.2.11
	RCRA Small Quantity Generator (SQG)	The site is listed under the names Tronox and Kerr-McGee on the RCRA database as both a SQG and a large quantity generator (LQG) of hazardous waste. The listing indicates that the facility has generated hazardous wastes with the following waste codes: D001, D003, D005, and D007. Based on the listing, the facility has been the subject of a number of state inspections related to hazardous waste management and received violations in December 1991, March 1994, and January 1997. Compliance has been achieved for these past violations.	No further discussion necessary.
	Toxic Release Inventory System (TRIS)	The site is listed in the TRIS database as having reported boron trichloride, chlorine, and manganese compounds on Form R reports.	No further discussion necessary.
	Polychlorinated Biphenyl (PCB) Activity Database System (PADS)	The site is listed under the name Kerr-McGee as a generator of PCBs, with a certification date from March 1990.	Section 5.2.5
	Toxic Substances Control Act (TSCA)	Tronox is listed on the TSCA database, which identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list.	No further discussion necessary.
	New York Manifest	The site is listed under the name Kerr-McGee for shipments of chromium waste and unspecified waste to a landfill in New York.	No further discussion necessary.
	California Facility and Manifest Data (HAZNET)	The site is listed for shipments of the following types of hazardous waste to TSDFs in California: off-specification, aged, or surplus organics; liquids with pH under 2; waste and mixed oil; aqueous solutions with less than 10% total organic residues; other inorganic solid wastes; asbestos-containing wastes; and other organic solids.	No further discussion necessary.

4.1.2 Database Review for Surrounding Properties

In addition to the site, there are several listings in the EDR report for off-site facilities located within applicable ASTM search radii. Several of these listings (e.g., hazardous waste generators, registered USTs, recycling facilities, historical auto stations), by themselves, are not necessarily indicative of an environmental concern, and these listings are therefore not discussed herein. A number of sites appear on databases indicative of potential contamination concerns (e.g., CERCLIS, CERCLIS-NFRAP, CORRACTS, RCRA TSDF, SHWS, and Leaking UST [LUST]), as discussed in Table 4 below. ENVIRON's analysis is based on the assumption that a hazardous material released to the subsurface generally does not migrate laterally within the unsaturated soil for a significant distance, although a hazardous material can migrate in groundwater in a generally downgradient direction; however, there are limitations to this interpretation.

Table 4: Summary of Environmental Database Listings Potentially Indicative of Environmental Concern

Listing Name or Address	Database	Comments	Reference for Further Discussion
Titanium Metals Corporation (8000 E Lake Mead Dr)	CERCLIS-NFRAP, TSDF	This property, located adjacent to the east of the subject property within the BMI Complex, is listed on the archived CERCLIS database. According to the listing, the site was brought to USEPA's attention in September 1979. A preliminary assessment was completed in November 1979, after which the site was assigned a low priority for further assessment. The site was the subject of site inspections in September 1986 (assigned a higher priority for further assessment), March 1990 (assigned a deferred to RCRA status), and November 1991 (assigned a NFRAP status). The facility is also listed on the TSDF database for the treatment, storage, or disposal of hazardous waste.	N/A, due to archived status of the CERCLIS listing and the absence of identified contamination concerns associated with the TSDF listing

Table 4: Summary of Environmental Database Listings Potentially Indicative of Environmental Concern

Listing Name or Address	Database	Comments	Reference for Further Discussion
Pioneer Americas, LLC DBA Olin (8000 Lake Mead Parkway) Stauffer/ Pioneer Chlor-Alkali, Former Bulk Transportation (BMI Complex)	CERCLIS, CORRACTS, SHWS, TDSF	This property is located adjacent to the west of the subject property within the BMI Complex. Based on the CERCLIS listing, the site was brought to USEPA's attention in September 1979. A preliminary assessment was completed in November 1979, after which the site was assigned a low priority for further assessment. The site was the subject of site inspections in May 1985 (assigned a higher priority for further assessment) and March 1990 (deferred to RCRA). According to the TSDF and CORRACTS listings, corrective action responsibility was referred to a non-RCRA federal authority in April 1991, and a RCRA facility assessment was completed in March 1993. In January 1998, the site was assigned a medium corrective action priority. There are three SHWS listings pertaining to: 1) a release of volatile organic compounds (VOCs), BHC isomers, chlorinated benzenes, and other constituents in April 1991 that impacted soil and groundwater (remains open); 2) a release of 3,260 pounds of sodium hydroxide to soil in April 1999 (closed in October 1999); and 3) a historic release of diesel fuel to soil that was remediated by Bulk Transportation (closed in April 2009).	See Section 4.3

Table 4: Summary of Environmental Database Listings Potentially Indicative of Environmental Concern

Listing Name or Address	Database	Comments	Reference for Further Discussion
Montrose Chemical Corporation (Lake Mead Dr) Montrose Chemical Company (BMI Complex)	CERCLIS-NFRAP, CORRACTS, SHWS, TSDF	This property is located adjacent to the west of the subject property within the BMI Complex. Based on the CERCLIS listing, the site was brought to USEPA's attention in September 1979. Preliminary assessments were completed in May 1980 and July 1988, after which the site was assigned a low priority for further assessment. The site was the subject of a site inspection in July 1990 and was then assigned a NFRAP status. According to the TSDF and CORRACTS listings, stabilization measures were completed in January 1984, a RCRA facility assessment was completed in October 1987, the site was assigned a medium corrective action priority in July 1988, stabilization construction was completed in January 1989, the site was again assigned a medium corrective action priority in February 1992, and a stabilization measures evaluation was completed in February 1992 (which concluded that the facility was not amenable to stabilization activity). The SHWS listing pertains to a confirmed release of chlorinated benzenes, pesticides, and other constituents reported in April 1991 that has impacted soil and groundwater; this listing remains open.	See Section 4.3
Saguaro Power Plant (8000 West Lake Mead Drive);	SHWS	This site, located within the BMI Complex, is listed for a lube oil release reported in May 1994 that received regulatory closure in October 1995.	N/A, due to closed status
Western Area Power Administration (BMI Complex)	SHWS	WAPA, located within the BMI Complex, is listed for a confirmed release of asbestos, PCBs, and other constituents reported to NDEP in July 1991. The medium affected is soil. The case remains active.	N/A, given that the affected medium is soil (i.e., not groundwater)
Chemstar Lime Company of Nevada and Chemstar, Inc. (BMI Complex)	SHWS	These listings for Chemstar, located within the BMI Complex, appear to have been mis-mapped in the EDR report. One listing pertains to a release of petroleum hydrocarbons and caustics in April 1991 that impacted soil and groundwater, which was granted regulatory closure in January 1995. A second listing pertains to an unspecified release granted regulatory closure in August 1993.	N/A, due to closed status

Table 4: Summary of Environmental Database Listings Potentially Indicative of Environmental Concern

Listing Name or Address	Database	Comments	Reference for Further Discussion
D.A. Heil-Del August Company (631 West Lake Mead Dr); Burkholder Junior High School (355 West Van Wagenen St); Nevada Pic-a-Part (110 West Rolly Street); Henderson Electric Motors (1414 Athol St); Southern Oasis Construction (1548 Athol St)	SHWS	These facilities, located in the immediate vicinity of the subject property or within one-quarter mile in an upgradient direction, are listed on the SHWS database for release incidents that were issued regulatory closure between 1990 and 2009.	N/A, due to closed status
Henderson Service Center (680 Lake Mead Dr)	LUST	Henderson Service Center, located just southwest of the subject property, is listed in the LUST database for a confirmed release of gasoline to soil that was reported to NDEP in December 1999. The case remains active.	N/A, given that the affected medium is soil (i.e., not groundwater)
Circle K Store (1324 North Boulder High)	LUST	Circle K Store, located just north of the subject property, is listed on the LUST database for gasoline, petroleum hydrocarbon, and perchlorate contamination in groundwater reported to NDEP in December 2002. The incident was issued regulatory closure in April 2007.	N/A, due to closed status
Circle K Corporation #1366 (450 N. Water Street)	LUST	Circle K Corporation #1366, located just under one-third mile east of the subject site, is listed on the LUST database for a release of gasoline reported to NDEP in January 1990 that impacted soil and groundwater. The incident was issued regulatory closure in April 2007.	N/A, due to closed status and downgradient location as compared to the subject site

Table 4: Summary of Environmental Database Listings Potentially Indicative of Environmental Concern

Listing Name or Address	Database	Comments	Reference for Further Discussion
Shell Station (65 West Lake Mead Drive); Texaco Station and Verns Texaco (3 East Lake Mead Drive); Burkholder Park (645 West Victory Road); Alleyway (38 Water Street); Lake Mead Chevron Food Mart (101 East Lake Mead Drive); St. Rose Dominican Hospital (102 Lake Mead Drive); Chevron #94668 (100 North Boulder Highway); Sprint Central Telephone (104 Water Street); 7-Eleven #13696 (120 E Lake Mead Drive); Unocal SS #5747 (100 South Boulder Highway); City of Henderson Police Department (243 South Water Street); City Department of Public Works (214 South Boulder Highway); K-Mart Store #9554 (498 Boulder Highway); Credit Auto Sales (1700 North Boulder Highway); Edgar Milloway Property (308 West Foster); C& P Enterprises (321 Foster Avenue); Monier Life Tile (430 Eastgate Road); Bonanza Materials (450 Eastgate Road); Basic Ready Mix (513 Eastgate Road); Raymond Land LLC (513 Eastgate Road); Independent Landscape Services (647 CapeHorn Drive)	SHWS	These facilities, which are located downgradient or over ¼-mile upgradient of the subject site, are listed on the LUST database for release incidents reported to NDEP. All of the LUST listings have been granted regulatory closure by NDEP.	N/A, due to closed status and location relative to the subject property

The EDR report indicates that poor or inadequate address information was available for several sites located in the vicinity of the property; therefore, these sites could not be readily mapped by EDR. Because the location of these sites with respect to the property could not be evaluated, ENVIRON is limited in its ability to express an opinion regarding the potential for impact to the property from these sites. It was beyond the scope of this review to accurately locate each of the unmapped sites identified by EDR; however, ENVIRON reviewed the list of unmapped sites

and verified that none appeared to be associated with the subject site or properties adjacent to the subject site, except as included in Tables 3 and 4 above.

4.2 Historical Use Information on the Site and Surrounding Area

The Tronox site is within the central portion of the larger BMI Complex. The BMI Complex (including the Tronox site) was initially developed by the U.S Government during World War II as a magnesium production facility. The BMI Complex was operated by the U.S. Government from August 31, 1942 to November 15, 1944 for the purpose of producing metallic magnesium in support of the war effort. Starting in 1945, Western Electrochemical Company (WECCO) began leasing a portion of the BMI Complex from the United States Government, and by 1952 WECCO had purchased portions of the complex (not part of the subject site). WECCO produced manganese dioxide, sodium chlorate, sodium perchlorate, ammonium perchlorate, and other perchlorates. In 1955, WECCO merged with American Potash and Chemical Company (AP&CC). In 1962, AP&CC purchased portions of the subject property, including the ammonium perchlorate plant, the sodium perchlorate plant, and half of the sodium chlorate plant, from the U.S. Government. Kerr-McGee purchased AP&CC in 1967 and gained control of the site. Kerr-McGee initiated production of boron chemicals in the early 1970s, including elemental boron, boron trichloride, and boron tribromide. The production of boron tribromide was discontinued in 1994, and the production of sodium chlorate and ammonium perchlorate were discontinued in 1997 and 1998, respectively. Perchlorate was reclaimed at the site using existing equipment until 2002. Tronox acquired the chemical division of Kerr-McGee in 2005.

A general summary of historical operations performed at the site is presented below. More detailed information is provided in the ECA report, included in Appendix C.

Operations by the U.S. Government (1942 to 1944)

The first step in the U.S. Government's production of magnesium metal involved mixing raw materials (including magnesia, magnesite, coal, and salts) in rotary mixers within the proportioning plant. The mixture was fed to several pug mills, where concentrated magnesium chloride solution (prepared by reacting raw materials with chlorination and refining wastes) was mixed with the dry mass to form a dough-like material. The dough-like material was sent to a preparation building and was processed and dried (using a tunnel kiln and rotary kilns) to form either pellets or blocks.

The remainder of the U.S. Government's magnesium process occurred within ten large identical buildings (Units 1 through 10), six of which were located on the current Tronox property. Each unit included a chlorination building, electrolytic cell building, rectifier building, motor generator building, and bridges that connected the units. Pelletized and chunked materials formed at the aforementioned preparation plant were transported to the units and charged into chlorinators (furnaces), where the materials reacted with chlorine gas at 850^{O}C to form anhydrous magnesium chloride. The molten anhydrous magnesium chloride was collected from the bottom of the chlorinator and fed to an electrolytic cell, where unrefined magnesium metal and chlorine were produced. The chlorine was recycled to the chlorinators, and the unrefined magnesium metal was cast into ingots (pigs) in a separate area and sent for refining and casting in molds.

Wastewater originating from the U.S. Government's processes was discharged to a storm sewer system, which emptied into unlined drainage ditches (primarily the Beta Ditch) that led to a system of unlined ponds (currently known as the upper and Lower BMI Ponds). In addition, while certain acid and caustic wastes generated as part of the process were reused in the production of concentrated magnesium chloride solution (for use in the pug mills), some acid effluent and waste caustic liquor were discharged to evaporation ponds. The wastes were initially discharged to four Trade Effluent disposal ponds within the BMI Complex and later to the upper and Lower BMI Ponds (see Section 5.2.9 for additional discussion of current and former surface water bodies). Solid materials (possibly wastes) were placed in an open area due south of the Trade Effluent disposal ponds and north of the caustic settling ponds (partially on the subject property).

The U.S. Government performed these activities throughout the BMI Complex. The portions of the BMI Complex comprising the subject property at that time included the following:

- Six metal processing unit buildings (Units 1 through 6) and the attached chlorination buildings, rectifier buildings, motor generator buildings, and bridges;
- A flux plant;
- Peat storage areas;
- An area with a salt storage building, pulverizer building, tunnel kiln building, rotary kiln building, pellet storage building, and magnesite silos;
- Various other buildings and open storage area; and
- An area occupied by approximately two and one-fifth of the original four Trade Effluent disposal ponds used for management of liquid waste generated by the U.S. Government operations.

Operations by Hardesty Chemical Company (1945 – Approximately 1949)

Beginning in 1945, Hardesty Chemical Company (Hardesty) leased and operated out of eight buildings in the BMI Complex, including Unit 2. Hardesty (and later a related company known as AMECCO Chemical) produced synthetic detergents, various chlorinated organics, chemicals for fireproofing paints, insecticides, and chlorinated solvents. Chemicals produced included chlorobenzol, muriatic acid, synthetic hydrochloric acid, monochlorobenzene, paradichlorobenzene, orthodichlorobenzene, and dichlorodiphenyltrichloroethane (DDT). It appears that AMECCO ceased operations at the site prior to June 1949.

Operations by Valite Industries, Inc. (1947 – Unknown)

Valite Industries, Inc. (Valite) leased a portion of the subject property for operations that involved building materials and plastics. Valite proposed to lease the southern half of the flux plant, including half of the crusher building, half of the conveyor ramp, half of the proportioning bins, and the barrel storage building. The leased facilities were located north of Units 5 and 6 on the Tronox property in the current manganese Leach Plant area. Valite also leased a room within a laboratory on an off-site portion of the BMI Complex.

Operations by WECCO (1945 – 1955)

WECCO began leasing Unit 4 in 1945. WECCO converted the existing magnesium plant into a perchlorate production facility, which involved removal of magnesium cell lines and installation of Schumacher-type chlorate and perchlorate cells along with other related equipment. The plant operated for approximately one month (in the summer of 1945) before World War II ended and the equipment was placed in stand-by condition. Under a new lease agreement, WECCO resumed operations in Unit 4 in February 1946 for the production of chlorates (sodium chlorate and potassium chlorate) and perchlorates (potassium perchlorate and ammonium perchlorate) for commercial markets. The areas incorporated in the lease included Unit 4, the salt storage area, the acid neutralization area, and miscellaneous office and storage areas. Subsequently, WECCO expanded its operations to include production of synthetic electrolytic manganese dioxide (a large pilot plant was placed in operation in 1951) and high purity manganese metal (beginning in 1953). In 1952, WECCO purchased portions of the BMI Complex, including Units 1 through 6, the preparation area, the neutralization plant area, the flux plant area, and numerous storage buildings, shops, and substations.

WECCO's sodium chlorate production activities involved conversion of sodium chloride solution to sodium chlorate in an electrolytic cell, purification, and separation from the brine solution by crystallization. This process involved the use of sodium dichromate (containing hexavalent chromium) in process solutions to aid the electrolytic process. The resulting sodium chlorate was either packaged as finished product or employed as a precursor for the on-site production of other chlorates and perchlorates. Much of the sodium chlorate was redissolved and formed the feedstock for the production of sodium perchlorate in another electrolytic cell, which itself was used in the production of ammonium perchlorate. Some sodium chlorate was also reacted with potassium chloride to form potassium chlorate. The same equipment was also used to produce potassium perchlorate from sodium perchlorate.

Throughout its tenure at the site, WECCO disposed of chlorate process wastes (i.e., graphite, calcium carbonate, and calcium sulfate) in the upper and Lower BMI Ponds. WECCO also disposed of perchlorate process solids in the BMI ponds between 1951 and 1955. In addition, WECCO disposed of manganese dioxide process wastes (i.e., manganese ore, heavy metal sulfides, diatomaceous earth and paraffin wax) in on-site leach beds (see Section 5.2.11) between 1951 and 1955.

Operations by AP&CC (1955 – 1967)

AP&CC acquired the site in 1955 following a merger agreement with WECCO. Chemicals produced and waste disposal practices employed by AP&CC were similar to those described above for WECCO's operations.

Operations by Kerr-McGee (1967 – 2005)

Kerr-McGee acquired the site in 1967 following a merger with AP&CC. Kerr-McGee produced the same chemical products as WECCO and AP&CC, but the following additional chemical products were also introduced: sodium perchlorate (which also involved the use of sodium dichromate), magnesium perchlorate (produced from reaction of ammonium perchlorate with magnesium carbonate), boron trichloride, elemental boron, and a sodium chlorate-based bleaching agent known as Tumbleaf Defoliant®. Production of chlorates (sodium chlorate and potassium chlorate) was performed in Units 3, 4, and 5; the electrolytic cells associated with the sodium chlorate process in Unit 3 were replaced with a different variety in 1989. The production of perchlorates (excluding ammonium perchlorate) was performed in Units 4 and 5. Production of ammonium perchlorate was performed in several buildings within the central portion of the site. Production of high purity, battery active manganese dioxide was performed in two areas: the ore was prepared and leached in the Leach Plant area north of Units 5 and 6, and the resulting manganese sulfate solution was fed to electrolytic cells in Unit 6. Kerr-McGee began production of boron products (elemental boron, boron trichloride, and boron tribromide) in 1972 and performed these activities in Unit 5. Boron tribromide production was discontinued in 1994. Kerr-McGee discontinued production of sodium chlorate and ammonium perchlorate in 1997 and 1998, respectively.

Initially, industrial wastewater generated from Kerr-McGee's industrial processes was discharged via the Beta Ditch to a series of surface impoundments located north of the site within the BMI "common areas" known as the BMI ponds (Upper and Lower Ponds). Between 1971 and 1976, Kerr-McGee altered its processes and constructed single- and double-lined on-site surface impoundments (for recycling and evaporation of wastewater) to achieve a "zero discharge" status for industrial wastewater. Impoundments were constructed to manage process liquids from the chlorate process, process liquids from the ammonium perchlorate process, potassium-bearing process fluids, and nonhazardous wastes including cooling tower liquids (see Section 5.2.9 for more information about current and former surface impoundments). Certain outdated surface impoundments were later closed out, and new impoundments were constructed.

Kerr-McGee disposed of certain chlorate and boron compound wastes at the BMI landfill (within the BMI Complex) until 1980, when this landfill closed (see Section 5.2.11 for information regarding former landfill areas). Between 1980 and 1983, chlorate wastes were disposed of at an on-site hazardous waste landfill (subsequently closed out); after 1983, these wastes were sent to an off-site hazardous waste landfill. Beginning in 1979, boron compound wastes were disposed of at an off-site sanitary landfill. Between 1967 and 1975, Kerr-McGee disposed of manganese dioxide wastes through on-site leach

beds; subsequently, the manganese dioxide wastes were disposed of through an on-site nonhazardous pile and more recently off-site.

Operations by Tronox (2005 – present)

Tronox acquired the chemical division of Kerr-McGee in 2005. Current operations performed by Tronox are summarized in Section 3.2 above.

Various Lessees During Kerr-McGee/Tronox Operations

Historical information suggests that various tenants have leased space from Kerr-McGee/ Tronox on the subject property. Some lessees used the site only for office space. Others appear to have performed industrial operations, including:

- J.B. Kelley leased property from Kerr-McGee for trucking operations immediately south and east of the truck unloading area. The company hauled commodities such as lime and ash.
- Koch Industries leased an area west of the diesel storage tank for use as an asphalt emulsion batch plant beginning in 1983 (continuing a former lease with Burris Oil and Chemical Company, also doing business as Basic Resources Company, from 1979 to 1983).
- Buckles Construction performed steel fabrication and equipment storage in the crane bay in the northwestern corner of Unit 1 from 1973 to 1989.
- Flintkote Company (a predecessor of Chemstar) leased a diesel aboveground storage tank (AST) from Kerr-McGee between July 1973 and 1975 near the southwest corner of the Chemstar property.
- Nevada Pick-a-Part, formerly Southern Nevada Auto Parts, leased property to store wrecked, impounded, and repossessed vehicles beginning in 1972.
- State Industries Inc. leased portions of the Kerr-McGee property for the manufacture and storage of hot water heaters at least between 1969 and 1988.
- Delbert Madsen leased the northeastern corner of the property as a storage and salvage yard between 1976 and 1995.
- Dillon Potter leased a two-acre portion of the property for livestock management and storage of approximately 25 vehicles beginning in 1972.
- Ebony Construction Company leased a portion of Unit 1 from 1977 to 1978 for construction management and staging activities.

4.3 Previous Environmental Assessments

ENVIRON reviewed numerous prior environmental reports that provide information regarding subsurface conditions beneath the Tronox site and the surrounding area. A summary of key information obtained from previous environmental reports is presented below.

Past Investigation and Remedial Measures to Address Chromium in Groundwater

A groundwater investigation was initiated by Kerr-McGee (now Tronox) in July 1981 to comply with federal RCRA standards associated with certain on-site impoundments. This investigation identified elevated chromium impacts in groundwater underlying the site. As noted in Section 4.2 above, hexavalent chromium in the form of sodium dichromate historically was used extensively at the site in the production of sodium chlorate and sodium perchlorate, and multiple source areas exist for the release of hexavalent chromium into site groundwater (e.g., process units, surface impoundments, waste storage and disposal areas).

Kerr-McGee and NDEP entered into a Consent Order in September 1986, which required additional groundwater characterization activities and the implementation of remedial activities to address the elevated chromium in groundwater. Pursuant to the Consent Order, Kerr-McGee installed monitoring wells and a groundwater interceptor well field (the IWF) consisting of 11 groundwater interceptor wells extending approximately 1,600 feet in an east-west direction (across the width of the plume containing chromium in excess of 5.0 mg/L). The IWF, which still operates at the site under a modified configuration, is located in the central portion of the property, approximately 2,400 feet north and downgradient of the central process area of the site including the Unit 1 through 6 buildings. The IWF system came on-line in September 1987. Extracted groundwater from the IWF was electrolytically treated to reduce chromium and other heavy metals and precipitate them as iron oxide sludge (a nonhazardous waste disposed off-site). Treated groundwater was reinjected through two parallel recharge trenches located approximately 250 feet downgradient (north) of the interceptor line.

Groundwater monitoring wells were used to evaluate the effectiveness of the interceptor and recharge systems. In 1993, an evaluation of the effectiveness of the chromium remediation system concluded that the extensive dewatering of the alluvium in the vicinity of the IWF and the localized groundwater flow in discrete channels in the Muddy Creek formation were contributing to a decline in recovery volumes. As such, additional groundwater recovery wells were installed over the next several years, and a bentonite-slurry barrier wall (approximately 1,600 feet long, 60 feet deep, and 3 feet wide) was installed on the downgradient side of the interceptor well line in 2001 to further enhance groundwater capture. In 1998, upon discovery of a perchlorate plume beneath the site (see description below), the reinjection of treated groundwater into the shallow aquifer ceased, and the groundwater was subjected to additional perchlorate treatment.

The IWF continues to operate at the site, although the treatment train has been modified to address the presence of perchlorates. Currently, 23 groundwater extraction wells are operational, which pump about 70 gallons per minute (gpm) from the shallow zone (mostly 35 to 50 feet depth). Reinjection of Lake Mead water into several gravel-filled trenches occurs approximately 250 feet downgradient of the barrier wall at a rate of approximately 57 gpm, pursuant to an Underground Injection Control (UIC) permit issued by NDEP.

Past Investigation and Remedial Measures to Address Perchlorate in Groundwater

In 1997, elevated perchlorate was detected in the Colorado River, the source of which was traced to the Tronox site and another ammonium perchlorate manufacturing facility in Henderson. Groundwater perchlorate investigations completed in 1997 and 1998 identified perchlorate concentrations ranging from 1,500 mg/L at the northern Kerr-McGee facility boundary to around 100 mg/L between the City of Henderson Rapid Infiltration Basins (RIBs) and the Las Vegas Wash. As an interim measure to address the perchlorate plume, a shallow zone recovery well was installed off-site at Athens Road (approximately 8,200 feet north of the barrier wall and the IWF) in 1998. Groundwater extracted from this well, as well as groundwater extracted from the IWF, was routed to an 11-acre lined pond (GW-11) and held for later perchlorate treatment.

In the spring of 1999, hydrologists with the Southern Nevada Water Authority discovered an approximately 400 gpm seep discharging into Las Vegas Wash that contained over 100 mg/L of perchlorate. Following investigation of this seep, Kerr-McGee entered into a Consent Agreement with NDEP (dated July 26, 1999) to initiate remedial measures to intercept and treat the seep discharge. Later in 1999, a weir-sump combination and temporary ion exchange (IX) system were installed to capture and treat the water discharged from the seep. After additional investigation of the seep was completed, in 2001 Kerr-McGee constructed three recovery wells in the seep vicinity, from which extracted groundwater was treated by the existing temporary IX system and later also by a second temporary IX system.

Another Administrative Order on Consent, entered into between Kerr-McGee and NDEP on October 8, 2001, further defined remedial requirements necessary to address the perchlorate contamination. Pursuant to this Order, Kerr-McGee completed the existing off-site Athens Road Well Field (AWF), the off-site Seep Well Field (SWF), and the associated on-site treatment system. The AWF, completed in 2002, consists of a series of 14 groundwater extraction wells at seven paired well locations that span roughly 1,200 feet of the alluvial paleochannels and pump from the shallow zone at a combined rate of approximately 280 gpm. The SWF, located approximately 4,500 feet north of the AWF near Las Vegas Wash (in the deepest part of the alluvium channel that comprises the migration path for the highest concentration of perchlorate), includes a surface pump (sump) for the seep flow and nine groundwater extraction wells to capture subsurface flow (approximately 530 gpm combined). With regards to the treatment system, Kerr-McGee initially designed an ISEP®/catalytic destruction process treatment plant that was later replaced with the existing biological FBR technology. The perchlorate treatment plant receives all extracted groundwater from the IWF, the AWF, the SWF, and the surface sump. Groundwater extracted from the IWF and AWF is also treated through a ferrous sulfate system to chemically reduce hexavalent chromium to trivalent chromium and with granular activated carbon to remove pesticides and other organics. Following treatment, all extracted water is discharged to Las Vegas Wash under a NPDES permit. The locations of the three groundwater extraction systems are depicted on Figure 6.

Current Groundwater Monitoring and Remediation Efforts

Pursuant to the aforementioned NDEP Orders, Tronox conducts an annual groundwater monitoring event, and additional monitoring of the remediation systems is conducted quarterly and monthly. The monitoring results indicate significant capture and ongoing reduction of the perchlorate and hexavalent chromium plumes. Perchlorate loading into Las Vegas Wash has declined by nearly 94% over the last 10 years of groundwater capture system operation. In general, perchlorate and chromium groundwater concentrations are highest at the site and decrease with distance towards the Las Vegas Wash. Overall, the higher concentration plumes of both constituents are narrow relative to their length, due to preferential flow and transport within the paleochannels. The perchlorate plume has an eastern and western area of high concentration upgradient of the IWF, reflecting two general source areas. The chromium plume is associated only with the more eastern of these source areas.

During the most recent annual sampling (May and June 2010), the highest perchlorate and chromium concentrations south (upgradient) of the IWF were 2,400 mg/L and 39 mg/L, respectively, whereas north (downgradient) of the recharge trenches the highest concentrations were 630 mg/L and 2.9 mg/L, respectively. Perchlorate and chromium concentrations typically attenuate with depth from the shallow to middle groundwater zones and within the middle zone groundwater at a given location. Chromium is not present above its risk-based groundwater concentration (RBGC) of 0.1 mg/L in the middle zone groundwater, and perchlorate attenuates markedly with depth to below 1 mg/L by approximately 150 feet bgs.

Although substantial perchlorate control and reduction have been achieved, elevated concentrations of perchlorate (in excess of 10 mg/L) continue to be observed in groundwater monitoring wells downgradient of the off-site hydraulic containment wells within the AWF. This groundwater continues to flow to the north to the SWF and the seep surface collection system. In 2010, Tronox began evaluation of alternatives for the enhanced control/treatment of perchlorate migrating in groundwater downgradient from the AWF to reduce the need for extraction in the SWF (about 90% of the total water throughput treated in the on-site water treatment plant is extracted from the SWF) and minimize the chance for perchlorate to migrate into Las Vegas Wash. One such alternative would be installation of an *in-situ* edible oil permeable reactive barrier (PRB), and Tronox submitted a work plan for pilot testing of this technology in June 2010.

While perchlorate and chromium are the constituents driving the groundwater remediation, elevated total dissolved solids (TDS), nitrate, and chlorate have also been identified in groundwater underlying the site. These constituents are monitored during the annual compliance monitoring described above. In addition, the groundwater at the site and vicinity has been impacted by chemicals that appear to have originated off-site, as described below.

Groundwater Contamination that Appears to Originate Off-Site

The adjacent property to the west (known as the Pioneer/Olin Chlor-Alkali/Stauffer/ Syngenta/Montrose [POSSM] property) was formerly the location of a chlor-alkali plant and a variety of manufacturing operations. Stauffer Management Company, LLC/ Syngenta Crop Protection, Inc., Montrose Chemical Corporation of California, and Olin Corporation have collectively performed investigation and remedial activities to address a commingled organic and inorganic compound contaminant plume emanating from this property. A groundwater treatment system is in place, and the companies are implementing a site-wide monitoring program.

Based on a groundwater evaluation report prepared by Hargis in September 2010, primary constituents of concern in the shallow groundwater zone at this adjacent property include VOCs, pesticides, metals (e.g., arsenic, uranium), perchlorate, and total dissolved solids (TDS). Middle zone groundwater is impacted with similar constituents as were identified in the shallow zone groundwater, but middle zone groundwater also contains dense non-aqueous phase liquid (DNAPL). Deep zone groundwater contains VOC impacts in one monitoring well and metals impacts in several wells.

Information presented in the Hargis report indicates that contaminants in excess of USEPA Maximum Contaminant Levels (MCLs) and NDEP Basic Comparison Levels (BCLs) for Residential Tap Water extend onto the Tronox property. During the 2010 sampling event, shallow and middle zone monitoring wells on the Tronox property were found to contain the following constituents in excess of MCL/BCL values:

Constituent	Maximum Detection in Shallow Zone Groundwater (µg/L)	Maximum Detection in Middle Zone Groundwater (µg/L)	MCL/BCL (µg/L)
1,2-dichlorobenzene	< MCL and BCL	7,500	600 (MCL and BCL)
1,4-dichlorobenzene	< MCL and BCL	13,000	75 (MCL and BCL)
Benzene	4,000	34,000	5 (MCL and BCL)
Chlorobenzene	11,000	250,000	100 (MCL and BCL)
Chloroform	14,000	24,000	1.62 (MCL and BCL)
Alpha-BHC	0.11	1.2	0.0170 (BCL)
Beta-BHC	0.04	0.35	0.0374 (BCL)
Gamma-BHC	< MCL and BCL	0.34	0.2 (MCL and BCL)
Arsenic	180	37	10 (MCL and BCL)
Uranium	52	160	30 (MCL and BCL)

In addition, DNAPL has been identified within a middle zone monitoring well on the western portion of the Tronox property that requires further characterization. It does not appear that contaminants were identified in excess of regulatory standards in the deep zone groundwater monitoring wells on the Tronox property.

Source Investigation and Soil Remediation Efforts

On April 25, 1991, Kerr-McGee and five other companies (past and present operators in the BMI Complex) entered into a Consent Agreement with NDEP to conduct additional environmental studies to assess site-specific environmental conditions resulting from

past and present industrial operations and waste disposal practices within the BMI Complex. In accordance with this Consent Agreement, Tronox submitted a Phase I ECA to NDEP in April 1993. This report identified 31 solid waste management units (SWMUs), 20 areas of known or suspected releases or spills, and 14 miscellaneous areas where site activities may have impacted the environment. These areas are listed in Table 5 below, and detailed information regarding each area is presented in the ECA (see Appendix C).

Based on the ECA and subsequent discussions with Kerr-McGee, NDEP issued a Letter of Understanding (LOU) in 1994 that identified 69 data gap areas (LOU-1 through LOU-69) that needed additional information, either in the form of further historical research or field sampling of site conditions. These LOUs are listed in Table 5 below and are depicted on Figure 4, and additional information about the LOUs is presented in the Conceptual Site Model report (see Appendix C). Subsequent to the issuance of the LOU, one additional potential source area was identified (known as the former U.S. Vanadium site). In 1996, Kerr-McGee signed another Consent Agreement with NDEP, establishing the process for proceeding with Phase II of the ECA. Between the issuance of this Consent Agreement and the early 2000s, Tronox collected additional data to fill the LOU-identified data gaps and ultimately prepared a Phase II ECA and a Supplemental Phase II ECA summarizing the results. Subsequently, a Conceptual Site Model report was submitted to NDEP in February 2005.

To further investigate known and potential source areas and locations of soil contamination, Kerr-McGee implemented two soil sampling programs (known as Phase A and B Source Investigations) that were completed in 2006 and 2008, respectively. These investigations identified a number of constituents in excess of BCL criteria within the upper 10 feet of soil, including dioxin, hexachlorobenzene, other semivolatile organic compounds (SVOCs), PCBs, asbestos, metals, organochlorine pesticides (OCPs), and perchlorate. In an Order dated December 14, 2009, NDEP directed Tronox to remove all soil containing chemicals of potential concern in excess of worker BCLs (or modified risk-based goals agreed upon by NDEP) from the site by the end of 2010. For the purposes of soil remediation activities, the main contaminated portions of the site were divided into the following five separate remediation zones (see Table 5 for information regarding the LOUs located within the different remediation zones and Figure 5 for a depiction of the remediation zones):

- RZ-A: an area on the southern portion of the site
- RZ-B: the area around the Unit buildings
- RZ-C: the ammonia perchlorate production area, Koch Materials area, pond and diesel storage tank area, and manganese tailings area
- RZ-D: the Trade Effluent ponds and ammonium perchlorate pad/drum recycling area (including the hazardous waste landfill)

- RZ-E: the Beta Ditch

Soil sampling in RZ-A (the southernmost zone) did not identify soils exceeding NDEP cleanup criteria, and therefore excavation activities were not planned in this area. In a Remedial Action Workplan (RAW), Kerr-McGee's consultant laid out a strategy for excavating chemically impacted soil within the upper 10-foot bgs horizon in areas RZ-B through E, to the extent such soils were accessible. These remediation activities commenced during 2010. As of December 31, 2010, approximately 872,000 tons of contaminated soil had been excavated, and excavation within the individual remediation zones was underway for RZ-B (~90% complete on a total soil mass basis), RZ-C (~60% complete), RZ-D (~94% complete), and RZ-E (~25% complete). Generally, areas excavated to depths greater than five feet have been or will be backfilled with clean fill. Upon completion of these activities, a Remedial Action Completion Report will be prepared and a human health risk assessment will be completed for all five remediation zones.

Certain impacted soils within the remediation zones that cannot be excavated due to physical constraints or other access issues will be addressed through Institutional Controls/ Environmental Covenants (I/Es). Currently, I/E areas have been proposed for the following site locations/features:

- I/E 1: Overhead utility rack
- I/E 2: Sodium chlorate filter cake processing area
- I/E 3: Footings for overhead pipe racks
- I/E 4 to 8: Unit Buildings 1 to 5
- I/E 9: Road into Chemstar plant
- I/E 10: Steam plant – utilities and infrastructure
- I/E 11: Gas lines, meters and telemetry wiring
- I/E 12: Diesel tank and tank containment structure
- I/E 14: Nevada Energy transmission line towers
- I/E 15: Effluent pipeline and utility corridor
- I/E 16: Equalization tanks
- I/E 17: Groundwater and WC ponds and berms
- I/E 18: Hazardous waste storage area
- I/E 19: Chemstar Road fire line and utilities

- I/E 20: Chemstar Road railroad line and utilities
- I/E 22: 9th Street utilities

The soil excavation program described above is estimated to reduce the mass of perchlorate in the vadose zone by about 5% (from approximately 800 tons to 760 tons). To further reduce perchlorate mass in deeper vadose zone soil after the excavation activities are complete, Tronox is considering *in situ* treatment methods (e.g., soil flushing with or without biotreatment). The feasibility of such methods will first be tested through laboratory column studies and field pilot studies.

The northern, western, and southern edges of the site, which are not within the boundaries of the aforementioned remediation zones, have been designated as Sale Parcels A, B (a portion sold to Nevada Pic-A-Part), C, D, E, F, G, H, I, and J (sold to Bobby Ellis). The Sale Parcels are not currently in use and were not included in the recent remediation efforts. Rather, Parcels A through D, F, G, and H are being investigated by the Basic Remediation Company. Parcel E is land that is jointly used by Montrose Chemicals and others, and it has not been investigated to date. The tenants on Parcels I and J are conducting investigations of these parcels independently from Tronox's investigations. To date, only Parcels A and B have been designated a No Further Action (NFA) status by NDEP (in correspondence dated April 8, 2008), although BRC submitted a closure report for Parcels C, D, F, G, and H in December 2010. The Sale Parcels are depicted on Figure 5.

Table 5: Summary of Areas of Concern Identified During the 1993 ECA

Description	ECA Designation [1]	LOU Designation	Remediation Zone
Process hardware storage area between Units 1 and 2	SWMU KMCC-001	LOU-25	RZ-B
Trash storage area north of Units 1 and 2	SWMU KMCC-002	LOU-26	RZ-B
PCB storage area in Unit 2	SWMU KMCC-003	LOU-27	RZ-B
Hazardous waste storage area north of Unit 2	SWMU KMCC-004	LOU-28	RZ-B
Sodium chlorate filter cake holding area north of Unit 3	SWMU KMCC-005	LOU-11	RZ-B
Hazardous waste storage area between Units 3 and 4	SWMU KMCC-006	LOU-12	RZ-B
Platinum drying unit north of Unit 4	SWMU KMCC-007	LOU-15	RZ-B
Solid waste dumpsters	SWMU KMCC-008	LOU-29	RZ-B
Manganese tailings area	SWMU KMCC-009	LOU-24	RZ-C
Old P-2 surface impoundment	SWMU KMCC-010	LOU-7	RZ-C
C-1 surface impoundment	SWMU KMCC-011	LOU-20	RZ-C
Mn-1 surface impoundment	SWMU KMCC-012	LOU-21	RZ-C
Hazardous waste landfill	SWMU KMCC-013	LOU-10	RZ-D
Trade Effluent settling ponds	SWMU KMCC-014	LOU-1	RZ-D

Table 5: Summary of Areas of Concern Identified During the 1993 ECA			
Description	**ECA Designation [1]**	**LOU Designation**	**Remediation Zone**
WC-1 (WC-West) surface impoundment	SWMU KMCC-015	LOU-22	RZ-D
WC-2 (WC-East) surface impoundment	SWMU KMCC-016	LOU-23	RZ-D
Ammonium perchlorate (AP) area - Pad 35	SWMU KMCC-017	LOU-30	RZ-D
Drum crushing/recycling area	SWMU KMCC-018	LOU-31	RZ-D
Groundwater remediation unit	SWMU KMCC-019	LOU-32	RZ-D
The Beta Ditch	SWMU KMCC-020	LOU-5	RZ-E
Sodium perchlorate platinum byproduct filter - Unit 5	SWMU KMCC-021	LOU-33	RZ-B
Former manganese tailings areas (West)	SWMU KMCC-022	LOU-34	RZ-C
Former manganese tailings areas (East)	SWMU KMCC-022	LOU-34	N/A, active area[2]
Closed surface impoundment S-1	SWMU KMCC-023	LOU-13	RZ-C
Closed surface impoundment P-1	SWMU-KMCC-024	LOU-14	RZ-C
Truck emptying/dump site	SWMU-KMCC-025	LOU-35	RZ-C
Former satellite accumulation point – Unit 3, maint. Shop	SWMU-KMCC-026	LOU-36	RZ-B
Former satellite accumulation point – Unit 6, maint. Shop	SWMU-KMCC-027	LOU-37	N/A, active area
Former satellite accumulation point – AP laboratory	SWMU-KMCC-028	LOU-38	RZ-C
Satellite accumulation point – AP maintenance shop	SWMU-KMCC-029	LOU-39	RZ-C
Storm sewer system	SWMU-KMCC-030	LOU-59	N/A, throughout site
Acid drain system	SWMU-KMCC-031	LOU-60	RZ-D
PCB transformer spill	SPILL-1	LOU-40	RZ-B
Unit 1 tenant stains	SPILL-2	LOU-41	RZ-B
Unit 2 salt redler	SPILL-3	LOU-42	RZ-B
Unit 4 and Unit 5 basements – Consent Agreement	SPILL-4	LOU-43	RZ-B
Unit 6 basements – Remediation project	SPILL-5	LOU-44	RZ-B
Diesel storage tank area – Stains	SPILL-6	LOU-45	RZ-C
Former main cooling tower and recirculation lines	SPILL-7	LOU-46	RZ-C
Leach plant area manganese ore piles	SPILL-8	LOU-47	N/A, active area
Leach plant anolyte tanks	SPILL-9	LOU-48	N/A, active area
Leach plant sulfuric acid storage tank	SPILL-10	LOU-49	N/A, active area
Leach plant area leach tanks	SPILL-11	LOU-50	N/A, active area
Leach plant area transfer lines to/from Unit 6	SPILL-12	LOU-51	RZ-B
AP Plant area screening and dryer buildings and sump	SPILL-13	LOU-52	RZ-C
AP Plant area tank farm	SPILL-14	LOU-53	RZ-C

Table 5: Summary of Areas of Concern Identified During the 1993 ECA			
Description	**ECA Designation [1]**	**LOU Designation**	**Remediation Zone**
AP Plant area change house/laboratory septic tank	SPILL-15	LOU-54	RZ-C
AP Plant area storage pads – 1990 fire	SPILL-16	LOU-55	RZ-D
AP Plant area Old Building D-1 – Washdown	SPILL-17	LOU-56	RZ-D
AP Plant area New Building D-1 – Washdown	SPILL-18	LOU-57	RZ-C
AP Plant transfer lines to surface impoundments	SPILL-19	LOU-58	RZ-D
AP plant transfer lines to sodium chlorate process	SPILL-20	LOU-57	RZ-D
Upper and Lower BMI Ponds (BMI common area)	MISC-1	N/A	N/A, common area[3]
BMI landfill (unnamed drainage ditch segment)	MISC-2	LOU-6	N/A, common area
Old sodium chlorate plant decommissioning	MISC-3	LOU-61	RZ-B
State Industries, Inc. (Kerr-McGee tenant)	MISC-4	LOU-62	RZ-A
J.B. Kelley, Inc. Trucking (Kerr-McGee tenant)	MISC-5	LOU-63	RZ-B
Koch Materials Company (Kerr-McGee tenant)	MISC-6	LOU-64	RZ-C
Nevada Precast Concrete Products (Kerr-McGee tenant)	MISC-7	LOU-65	RZ-B
Green Ventures International (Kerr-McGee tenant)	MISC-8	LOU-65	RZ-B
Buckles Construction Company (Kerr-McGee tenant)	MISC-9	LOU-65	RZ-B
Ebony Construction Company (Kerr-McGee tenant)	MISC-10	LOU-65	RZ-B
AST leased by Flintkote Company (Kerr-McGee tenant)	MISC-11	LOU-66	N/A, Chemstar site[4]
Delbert Madsen (Kerr-McGee tenant)	MISC-12	LOU-67	N/A, not in a zone[5]
Southern Nevada Auto Parts Area (Kerr-McGee tenant)	MISC-13	LOU-68	N/A, not in a zone
Dillon Potter (Kerr-McGee tenant)	MISC-14	LOU-69	RZ-D
Open area south of Trade Effluent ponds	N/A	LOU-2	RZ-D
Air pollution emissions from industrial processes	N/A	LOU-3	N/A, throughout site
Hardesty Chemical Company site	N/A	LOU-4	RZ-B
Old P-3 Pond and associated conveyance facilities	N/A	LOU-8	RZ-C
New Pond P-2 and associated piping	N/A	LOU-9	RZ-C
Ponds AP-1, 2, 3 and associated transfer lines	N/A	LOU-16/17	RZ-C
Pond AP-4	N/A	LOU-18	RZ-C
Pond AP-5	N/A	LOU-19	RZ-D

Table 5: Summary of Areas of Concern Identified During the 1993 ECA			
Description	**ECA Designation [1]**	**LOU Designation**	**Remediation Zone**

Notes:
1) SWMU numbers are based on their numerical designations in the 1993 ECA. The SPILL and MISC numbers were designated by ENVIRON based on the chapter headings under Known or Suspected Releases or Spills (SPILLS) and Miscellaneous Activities (MISC) in the ECA.
2) Certain active areas of the plant are not designated for remediation, and instead will be addressed through an Institutional Control/Environmental Covenant.
3) Common areas of the BMI Complex are being addressed separately and are beyond the scope of this review.
4) The Chemstar site is not within the subject property and therefore is beyond the scope of this review.
5) Certain former tenant areas are not within the designated Remediation Zones.
6) It should be noted that there are areas underlying current industrial operations that have not been fully investigated and could represent additional areas of concern.

Vapor Intrusion Evaluations

AECOM performed a site-wide evaluation of soil gas conditions beneath the site in May 2008. Results of the investigation indicated that chloroform, trichloroethylene (TCE), chlorobenzene, carbon tetrachloride, and trichlorofluoromethane were detected at elevated concentrations in soil gas beneath the site. Elevated concentrations of VOCs in soil gas primarily appeared to be localized within specific areas, such as the western area, the Unit 4 building, the Old P-3 Pond, Pond S-1, the former truck emptying/dumping site, the ammonium perchlorate laboratory building and former satellite accumulation point, and the former State Industries catch basin. A Site-Wide Soil Gas Human Health Risk Assessment submitted to NDEP in November 2010 concluded that chloroform contributed up to 99% of the overall potential excess cancer risk related to inhalation of vapors in indoor air at the majority of the site, with carbon tetrachloride representing the only other contaminant of concern with a total excess cancer risk above 10^{-6} (the target risk established by NDEP for the BMI Complex). Given the presence of vapor intrusion concerns in excess of NDEP's target risk level, risk management activities may be needed for existing buildings and future construction.

4.4 User-Provided Information

Because the site has been extensively investigated under the purview of the NDEP since the 1980s, it was determined that only duplicative information would be provided in a User Questionnaire consistent with Appendix X3 of the ASTM Standard. Therefore, a User Questionnaire was not prepared as part of this assessment.

Information provided by the client's counsel indicated that there are currently no environmental liens on the property.

5 Site Reconnaissance

5.1 Methodology and Limiting Conditions

Allan DeLorme of ENVIRON conducted a visit to the site on December 14, 2010. During the site visit, observations of both the interior of the buildings and exterior portions of the site were made to evaluate if any RECs, as defined in Chapter 2, are present.

5.2 General Site Setting and Observations

ENVIRON made observations concerning all of the interior and exterior issues specified in Sections 9.4.2 through 9.4.4 of the ASTM E1527-05 Standard. The presence or absence of each issue of environmental interest or concern is noted in Table 6. Only those areas of environmental interest or concern that were observed at the property are discussed further in the text below.

Table 6: Summary of Site Reconnaissance Observations

Issue	ASTM Section	Observation
Interior and Exterior Issues		
Current use(s) of the property	9.4.2.1	See Section 3.3
Past use(s) of the property	9.4.2.2	See Section 4.2
Hazardous substances and petroleum products used, treated, stored, disposed of, or generated on the property in connection with identified present or past uses	9.4.2.3	**Present** (see Section 5.2.1)
Storage tanks: Underground storage tanks (fill ports, vent pipes, manholes) Aboveground storage tanks	9.4.2.4	(see Section(s) 5.2.2 and 3) **Formerly Present** **Present**
Odors (strong, pungent or noxious)	9.4.2.5	Absent
Pools of liquid, standing surface water or sumps	9.4.2.6	**Present** (see Section 5.2.4)
Drums of hazardous substances or petroleum products (five-gallon, 55-gallon or totes)	9.4.2.7	**Present** (see Section 5.2.1)
Hazardous substance and petroleum product containers (not necessarily in connection with identified uses)	9.4.2.8	**Present** (see Section 5.2.1)
Unidentified substance containers suspected of containing hazardous substances or petroleum products	9.4.2.9	**Potentially Present** (see Section 5.2.1)
Polychlorinated biphenyls (PCBs) Electrical equipment on-site (e.g., transformers, capacitors) Electrical equipment known or likely to contain PCBs Hydraulic equipment on-site (e.g., elevators, truck dock lifts) Hydraulic equipment known or likely to contain PCBs	9.4.2.10	(see Section 5.2.5) **Present** **Possible/Formerly Present** **Present** **Possible**
Interior Issues		
Heating/cooling systems	9.4.3.1	**Present** (see Section 5.2.6)

Table 6: Summary of Site Reconnaissance Observations		
Issue	**ASTM Section**	**Observation**
Stains or corrosion on interior floors, walls or ceilings (except for staining from water)	9.4.3.2	**Present** (see Section 5.2.7)
Floor drains and interior sumps	9.4.3.3	**Present** (see Section 5.2.8)
Exterior Issues		
Pits, ponds or lagoons on property or adjacent sites	9.4.4.1	**Present** (see Section 5.2.9)
Stained soil or pavement	9.4.4.2	**Present** (see Section 5.2.10)
Stressed vegetation (from other than insufficient water)	9.4.4.3	Absent
On-site solid waste disposal; areas apparently filled or graded by non-natural causes; or mounds or depressions suggesting solid waste disposal	9.4.4.4	**Present** (see Section 5.2.11)
Wastewater or other liquid (including storm water) or any discharge into a drain, ditch, underground injection system or stream on or adjacent to the property	9.4.4.5	**Present** (see Section 5.2.12)
Wells (including dry wells, irrigation wells, injection wells, abandoned wells, or other wells)	9.4.4.6	**Present** (see Section 5.2.13)
Septic systems or cesspools	9.4.4.7	**Present** (see Section 5.2.14)
Notes: Observations noted in this table and discussed further below are based on information obtained during the site visit and from a review of the sources summarized in Section 4. See the ASTM Standard for a detailed description of the issues included in each referenced ASTM section. Per the ASTM Standard, fluorescent light ballasts likely to contain PCBs do not need to be noted. N/A – Not applicable		

5.2.1 Hazardous Substances and Petroleum Products

As detailed in Section 3.2 above, the site uses a wide variety of hazardous materials in its inorganic chemical manufacturing operations. Primary raw materials used on-site in production activities include:

- Manganese dioxide ore; coal, coke or natural gas; sulfuric acid; barium sulfide; diatomaceous earth; lime; hydrogen sulfide; and flocculent within the Leach Plant;
- Manganese sulfate solution (from the Leach Plant) and paraffin wax in the manganese dioxide process;
- Boric acid, magnesium metal, argon, sulfuric acid, steam, and soda ash in the elemental boron process; and
- Boron carbide and chlorine gas in the boron trichloride process.

In addition to these raw materials, the facility maintains various water treatment chemicals, petroleum products, refrigerant chemicals, degreasers, detergents, lubricants, and other

maintenance-related chemicals throughout the site. Tronox maintains a Hazardous Materials Permit issued by the Nevada State Fire Marshal associated with its hazardous materials storage.

Prior site assessments have identified potential contamination concerns associated with a number of current and former chemical storage areas (see Section 4.3). Some of these areas have been investigated and/or remediated under NDEP oversight, while other areas have not yet been fully addressed. Contamination concerns associated with the site are summarized in Section 6.1.1.

5.2.2 Underground Storage Tanks

ENVIRON has not identified any USTs currently maintained on-site, nor does it appear that Tronox (or its corporate predecessor, Kerr-McGee) historically maintained USTs on-site. Records reviewed by ENVIRON suggest that two former site tenants historically maintained USTs at the site, as summarized below.

Hardesty/AMECCO, a former tenant that operated on-site in the mid- to late 1940s, apparently operated two USTs containing kerosene and benzene to the north of Unit 2. In addition, available records indicate that this company maintained a tank farm storing unspecified materials to the north of Unit 2; it is unknown whether the tank farm consisted of underground or aboveground tanks. No information was readily available regarding the closure of the Hardesty/AMECCO tanks. The kerosene and benzene USTs and the tank farm were identified as an area of potential concern in NDEP's LOU (identified as LOU-4). In 1997, a groundwater sample was collected from a monitoring well located downgradient of this area for analysis of VOCs, SVOCs, specific conductance, total petroleum hydrocarbons (TPH), pH, and arsenic. The sampling did not identify significant impacts associated with the former USTs.

J.B. Kelley, Inc., a trucking operation that later leased a portion of the former Hardesty/ AMECCO leasehold, maintained a 10,000-gallon fiberglass UST for diesel fuel and a 600-gallon porcelain ceramic-lined UST with an attached sump for waste oil. Both USTs were single-walled. Information from the ECA indicates that the two USTs were removed in 1991, at which time both were found to have leaked. Surrounding petroleum hydrocarbon-contaminated soils were excavated at the time of the tank removals. The USTs and eight open concrete vaults formerly used by J.B. Kelley, Inc. for management of truck wash water were collectively identified as an area of potential concern (LOU-63). Soil sampling performed in this area in the 1990s did not identify significant impacts, although groundwater sampling from an existing nearby well in 1992 identified benzene (48 µg/L) and ethylbenzene (114 µg/L).

No evidence of other former USTs was identified, although the presence of other past USTs cannot be ruled out based on the long industrial history of the site. Contamination concerns associated with the site are summarized in Section 6.1.1.

5.2.3 Aboveground Storage Tanks

A number of ASTs are present at the site. ENVIRON has repeatedly requested but not yet received an inventory of these ASTs. During the site visit, ENVIRON did not observe visual evidence of significant contamination from current ASTs.

During the site's long industrial history, numerous ASTs have historically been used. Prior site assessments (see Section 4.3) have identified potential contamination concerns associated with locations of certain existing or former ASTs, including the diesel storage tank area (LOU-45), the Leach Plant anolyte tanks (LOU-48), the Leach Plant sulfuric acid tanks (LOU-50), the AP plant area tank farm (LOU-53), and an AST leased by Flintkote Company that may have been on the adjacent Chemstar site (LOU-66). Some of these areas have been investigated and/or remediated under NDEP oversight, while other areas have not yet been fully addressed. Contamination concerns associated with the site are summarized in Section 6.1.1.

5.2.4 Pools of Liquid, Standing Surface Water, or Sumps

Five active surface impoundments and a drainage ditch are currently present on-site, and a number of additional surface water bodies were historically maintained on-site that have since been closed out. A more detailed discussion of current and former surface water bodies is presented in Section 5.2.9 below.

During the site's long industrial history, numerous sumps have been in use. Prior site assessments (see Section 4.3) have identified potential contamination concerns associated with the locations of certain sumps, including sumps in the AP Plant area (LOU-52) and in the basements of certain Unit buildings (LOU-43 and LOU-44). Contamination concerns associated with the site are summarized in Section 6.1.1.

5.2.5 Polychlorinated Biphenyls (PCBs)

Because the facility was constructed before the 1979 federal ban on the manufacture of PCBs, it is possible that transformer oil, electrical equipment (e.g., capacitors), and hydraulic equipment present on-site contain PCBs. According to the ECA, at one time there were 22 PCB-containing transformers located at the site, but only 12 PCB-containing transformers remained as of the date of the 1993 ECA. ENVIRON has repeatedly requested from facility personnel but not yet received an inventory of remaining PCB-containing equipment.

As noted in Section 4.1.1 above, Tronox is listed on the PADS database as a generator of PCBs. According to the ECA report, the facility began storing PCBs and PCB-containing equipment within a dedicated area on the northern portion of Unit 2 in 1978. This fenced storage area consisted of three, approximately 12-foot by 15-foot vaults with floors that were approximately one foot lower than the surrounding area. The floors were covered with plastic sheeting to reduce the possibility of PCB oil spills reaching the concrete floor. Transformers with PCB-containing cooling oils were occasionally brought to the vaults, where the used oil was drained from the transformers and transferred to 55-gallon drums. This area was also used for storage of 55-gallon drums of PCB-contaminated wastes, such as rags, oil sorbent, and concrete. The PCB-containing wastes were ultimately sent off-site for disposal.

Information from the ECA indicates that Kerr-McGee was the subject of a USEPA inspection related to compliance with the PCB-related provisions of the Toxic Substances Control Act (TSCA) on January 24, 1989. With regards to the PCB storage area, the inspection report indicated that "the drums were properly stored in an area conforming to the permanent storage requirements. Monthly inspections of all in-service and equipment stored for reuse had been

conducted since 1981…Annual documents had been maintained since 1978. They appeared to be in order."

Prior site assessments (see Section 4.3) identified the PCB storage area as a potential contamination concern (LOU-27).

5.2.6 Heating/Cooling Systems

Various heating/cooling systems are maintained at the site, both for comfort and process climate control needs. Some of the units are staged near or within buildings and others are roof-mounted. The heating/cooling systems have not specifically been targeted in prior site assessments as potential contamination concerns, except for the main cooling tower and recirculation lines (LOU-46). Contamination concerns associated with the site are summarized in Section 6.1.1.

5.2.7 Stains or Corrosion on Interior Floors, Walls, or Ceilings

Staining and corrosion on interior floors, walls, and ceilings were noted during ENVIRON's site tour and prior environmental assessments, as would typically be expected for a facility used for heavy industrial activities over the course of nearly seventy years. Tronox is in the process of performing remedial activities to address contamination in areas not under active use, as described in Section 4.3. Contamination concerns associated with the site are summarized in Section 6.1.1.

5.2.8 Floor Drains and Interior Sumps

During the site's long industrial history, numerous sumps and drains have been in use. A discussion of sumps was provided in Section 5.2.4 above. In addition, the BMI Complex historically used an acid drain system to collect acid effluent from throughout the BMI Complex. Constructed in 1941/2, the system was comprised of a network of pipes, manholes, and sumps (initially fed during magnesium oxide processing operations by the chlorine plant, the preparation building, the flux plant and neutralization area, and the ten chlorination buildings and associated electrolysis buildings) that discharged via a single outfall at the acid effluent neutralization plant. The acid effluent was initially neutralized with waste caustic liquor from the chlorine plant and discharged to the Trade Effluent disposal ponds. After the caustic line disintegrated, the acid waste was discharged directly to the Trade Effluent ponds without neutralization. Once magnesium oxide processing ceased in 1945, the acid drain system was apparently used by several companies to discharge various wastes through 1976. The system appears to have carried effluents from the on-site basements of Units 1 through 6, as well as wastes from off-site companies. The acid drains in certain non-operating portions of the site (e.g., Units 1 and 2) have been filled with concrete debris and soil. The acid drain system has been identified during prior assessments as a potential contaminant source (LOU-60).

Contamination concerns associated with the site are summarized in Section 6.1.1.

5.2.9 Pits, Ponds, and Lagoons

Several surface water bodies are present on the subject site and the adjacent properties to the west and east. In addition, numerous surface impoundments were formerly located on-site that

are no longer used, some of which have since been closed out. A summary of current and former surface water bodies on and adjacent to the site is presented below. Contamination concerns associated with the site are summarized in Section 6.1.1.

Active Surface Impoundments Located on the Subject Property

Tronox maintains four lined ponds on the site for process-related wastewater (WC-West, WC-East, Mn-1, and AP-5) and one lined pond (GW-11) for extracted groundwater associated with remediation systems (see Section 4.3). Except for GW-11, which was installed after completion of the ECA and issuance of NDEP's LOU, these impoundments were identified during the prior assessments as potential contaminant sources (WC-East as LOU-23, WC-West as LOU-22, Mn-1 as LOU-21, and AP-5 as LOU-19).

A summary of the active surface impoundments is presented in Table 7 below. Applicable surface impoundments are operated pursuant to Tronox's two NPDES permits and an NDEP-approved leak detection program.

Closed Surface Impoundments Formerly Located on the Subject Property

The facility formerly contained a number of additional surface impoundments that have since been closed out. Many of these impoundments have been identified during prior assessments as potential contaminant sources, including the Old P-2 Pond (LOU-7), the Old P-3 Pond (LOU-8), C-1 (LOU-20), Trade Effluent settling ponds (OU-1), S-1 (LOU-13), P-1 (LOU-14), the New P-2 Pond (LOU-9), AP-1 to 3 (OU-16/17), AP-4 (LOU-18), and the two State Industries, Inc. impoundments (LOU-62). The closed surface impoundments identified as potential contaminant sources in the ECA and/or the LOU are summarized in Table 7 below.

Table 7: Current Surface Impoundments and Former Surface Impoundments Identified at the Site in the ECA and/or LOU

Impoundment	Description
Active Surface Impoundments Located on the Subject Property	
GW-11	This approximately 11-acre, double-lined impoundment (equipped with leak detection between the liners) is located in the area of the former Trade Effluent ponds on the northern portion of the subject property. GW-11 was constructed in late 1998 to contain perchlorate-containing groundwater extracted from the IWF and the AWF systems. This pond is still in use for storing extracted groundwater prior to its treatment and discharge.
WC-East (also known as WC-1)	This double-lined wastewater surface impoundment (equipped with leak detection between the liners), with a 67,600-square foot surface area and a capacity of 12,515,200 gallons, is located within the former Trade Effluent settling pond area on the northern portion of the subject property. WC-East was placed into operation in 1989 and subsequently received a composite liquid waste stream from Units 3, 5, and 6 and the steam plant. The solutions discharged to WC-East include process water softeners, steam generation blowdown, cooling tower blowdown from Units 3 and 5, manganese dioxide product wash solution from Unit 6, manganese dioxide cathode wash solution, process seal water/filter flush, and concentrated brine from the vapor recompression units. Solution from WC-East was processed through vapor recompression units to reclaim water for cooling and process use, and the concentrated brine effluent was discharged to surface impoundments WC-East

Table 7: Current Surface Impoundments and Former Surface Impoundments Identified at the Site in the ECA and/or LOU	
Impoundment	**Description**
	or WC-West. Currently, WC-East continues to receive process wastewater discharges, which are routed through an on-site distillation process for purification before being recycled back to the process water system. WC-East was designated as LOU-23 and is being addressed as part of RZ-D.
WC-West (also known as WC-2)	This triple-lined wastewater surface impoundment (equipped with leak detection between the liners), with an 88,580-square foot surface area and a capacity of 19,658,500 gallons, is located within the former Trade Effluent settling pond area near the east-central portion of the subject property. WC-West was placed into operation in 1988 and subsequently received waste streams similar to those received at WC-East, as described above. Currently, WC-West continues to receive process wastewater discharges, which are routed through an on-site distillation process for purification before being recycled back to the process water system. WC-West was designated as LOU-22 and is being addressed as part of RZ-D.
Mn-1	This double-lined process wastewater surface impoundment (equipped with leak detection between the two liners), with a surface area of 53,000 square feet and a capacity of 3,500,000 gallons, is located near the eastern property boundary, approximately 200 feet north of the manganese tailings pile area. Mn-1 was placed into operation in 1983 and is used to hold nonhazardous industrial liquid waste for evaporation (the pond is not equipped to recycle liquids back to the process). Wastewaters received include manganese dioxide cell feed filter waste and potassium phosphate cathode wash solution. Historically, Mn-1 also received calcine belt filter wash water from the manganese dioxide Leach Plant until 1989. Wastewater discharged to Mn-1 is nonhazardous but contains calcium, magnesium, manganese from cathode scale, tank mud, cell sludge, sodium hexametaphosphate, and other naturally occurring constituents. Mn-1 was designated as LOU-21 and is being addressed as part of RZ-C.
AP-5	AP-5, covering an area of approximately 10.88 acres, was historically used associated with the former ammonium perchlorate process, specifically as part of a larger impoundment cluster used to concentrate dilute ammonium perchlorate-containing solutions. Closure of AP-5 was the primary subject of an Administrative Order on Consent entered into between NDEP and Kerr-McGee on April 12, 2005. Remediation activities (currently planned for 2011) will involve dewatering the pond (with effluent discharged to GW-11), removing the solids (for off-site disposal following dewatering), and excavation of the underlying liner. During this process, any identified contamination underlying the pond would also be addressed in accordance with NDEP requirements. AP-5 was designated as LOU-19 and is located within RZ-D.
Closed Surface Impoundments Formerly Located on the Subject Property	
Old P-2 and P-3	The Old P-2 Pond, installed in 1972 with a 12,000-square foot surface area and a 350,000-gallon capacity, was located approximately 300 feet southwest of the steam plant. Installed in 1972, the Old P-3 Pond had an approximate surface area of 13,000 square feet. Both ponds were taken out of service and decommissioned in 1990. During their operation, the Old P-2 and P-3 Ponds received sodium chlorate solution from process washdown, excess solution above the handling capacity of the process vessels, storm water from the process area, caustic scrubber solution from the ammonium perchlorate plant, and solution from cooling tower leaks. These solutions were concentrated in the surface impoundments through evaporation and then returned to the process where residual sodium chlorate was recovered. Process liquids sent to the surface impoundments contained hexavalent chromium, sodium chloride, sodium chlorate, and sodium perchlorate, but apparently were not considered hazardous waste.

Table 7: Current Surface Impoundments and Former Surface Impoundments Identified at the Site in the ECA and/or LOU	
Impoundment	**Description**
	Although the ponds were always lined, the lining was replaced on several occasions due to leaks and failures. With respect to the Old P-2 Pond, leaks were identified with the original single liner in 1980, and a second single liner failed (resulting in the release of approximately 50,000 gallons of solution) in 1982. The third liner placed in the Old P-2 Pond also was found to have leaked in 1984 or 1985. No detailed information regarding the liner associated with the Old P-3 Pond was located. Soil sampling within the ponds during the 1990s identified elevated chromium levels. The Old P-2 and P-3 Ponds were designated as LOU-7 and LOU-8, respectively. They are being addressed as part of RZ-C.
C-1	This single-lined process wastewater surface impoundment, with a 69,000-square foot surface area and an approximate capacity of 3,125,000 gallons, was located near the eastern property boundary, approximately 400 feet north of the manganese tailings pile area. C-1 was constructed in 1974 and was used to hold nonhazardous industrial liquid waste for evaporation (the pond was not equipped to recycle liquids back to the process). Wastewaters received included boiler plant blowdown, boiler plant washdown, manganese dioxide cathode wash solution, boron neutralization solutions, hot process water softener solutions, and main cooling tower blowdown and filter wash. Wastewater discharged to C-1 was nonhazardous but contained sodium hexametaphosphate, neutralized sulfuric acid, calcium and magnesium hydroxide, metal wastes, various sulfates and phosphates, and boron neutralization wastewater. C-1 and associated piping were decommissioned in 1994. C-1 was designated as LOU-20 and is being addressed as part of RZ-C.
Trade Effluent settling ponds	The U.S. Government formerly operated four Trade Effluent settling ponds on the north-central side of the BMI Complex, of which about two and one-fifth extended onto the subject property. The original system was comprised of four surface impoundments and a distribution pipeline; each settling pond had an area of approximately 20 acres and an average liquid level depth of 7.5 feet. The impoundments contained earthen sides and a French drain system. The ponds likely received wastes between 1942 and 1944, although details regarding their use are not known. Liquid wastes discharged to the pond included acid process liquor (hydrochloric acid generated from primary and secondary scrubbing towers that washed chlorinator exhaust gases in the chlorination process) and caustic process liquors (presumed to be sodium hydroxide generated from absorber towers installed to remove the last traces of chlorine and hydrochloric acid passing the primary and secondary scrubber towers). After use of the settling ponds by the U.S. Government ceased, solid materials/wastes were also placed in this area at various times between 1945 and 1979. The nature of these materials is unknown. Portions of the southern extent of this area were converted to ammonium perchlorate storage areas by 1953. The western portion of this area was subsequently operated as a hazardous waste landfill (see Section 5.2.11). Surface impoundments WC-East and WC-West were constructed in the northeastern portion of this area in 1988. Limited soil sampling performed in the 1990s in this area did not identify significant contamination. The on-site locations of the former Trade Effluent ponds were designated as LOU-1 and are being addressed as part of RZ-D.
S-1 and P-1	Single-lined wastewater surface impoundments P-1 and S-1 were located approximately 200 feet and 60 feet south of the steam plant, respectively. The impoundments were constructed in an area that had previously been used for deposition of solid materials, including manganese dioxide process tailings (see Section 5.2.11). P-1 had an approximate surface area of 26,000 square feet and an approximate capacity of 700,000 gallons. S-1 had an approximate surface area of 47,500 square

Table 7: Current Surface Impoundments and Former Surface Impoundments Identified at the Site in the ECA and/or LOU	
Impoundment	**Description**
	feet and an approximate capacity of 2,000,000 gallons. Each impoundment was constructed as an evaporation pond (not equipped to recycle liquids back to the process). Both ponds managed liquid wastes from the potassium chlorate, potassium perchlorate, sodium perchlorate, and boron manufacturing processes, as well as cooling tower and reboiler wastes from the boron trichloride process. In addition, S-1 received wastes from the sodium chlorate process, and P-1 received liquors, residual salt solutions, and rinsates generated during decommissioning and closure of pond S-1 and decommissioning of the potassium perchlorate manufacturing process. Liquid wastes discharged to both impoundments reportedly contained chromium in excess of hazardous waste criteria. P-1 operated from 1972 to 1975, when it was abandoned because the original liner had failed; it was relined and subsequently operated from 1980 to 1983. S-1 operated from 1974 to 1982, and records suggest that a liner failure may have been identified in 1980. Both impoundments were closed in 1983/4 pursuant to RCRA under a NDEP-approved closure plan, and confirmatory soil sampling was performed to demonstrate that residual chromium levels were below the required cleanup level of 5.0 mg/L. Soils contaminated with chromium were removed during closure activities associated with both ponds. NDEP approved final closure of S-1 and P-1 on December 5, 1985. S-1 and P-1 were designated as LOU-13 and LOU-14, respectively. They are being addressed as part of RZ-C.
New P-2 Pond	The New P-2 Pond replaced the Old P-2 and P-3 Ponds, and it received similar wastewater discharges. This pond was initially constructed with two synthetic liners. Approximately 18 months after it was constructed, a third polyethylene liner was installed. This pond had leak detection that was monitored monthly. The date of decommissioning of this pond is unknown. The New P-2 Pond was designated as LOU-9 and is being addressed as part of RZ-C.
AP-1, 2, 3 and 4	These lined surface impoundments were used associated with the former ammonium perchlorate process, specifically to concentrate dilute ammonium perchlorate-containing solutions. AP-1, AP-2, and AP-3 were placed into operation in May 1974. Impoundment AP-2 was found to have leaked in 1979, and the liner was replaced (along with the liner for AP-3). Impoundments AP-1 and AP-3 required frequent patching by late 1983 to mitigate leaks that had developed; the liners were ultimately replaced with double liner systems. Elevated nitrates were identified in groundwater downgradient of AP-1, 2, and 3 in the 1990s. No detailed information was reviewed related to AP-4. The date of decommissioning of these ponds is unknown. AP-1, 2, 3, and 4 were designated as LOU-16, 17, and 18. They are being addressed as part of RZ-C.
State Industries, Inc. Impoundments	State Industries, Inc. operated two surface impoundments on the southwestern portion of the site beginning in 1972 associated with its hot water heater manufacturing operations. Both impoundments were single-lined. The western impoundment was circular and measured approximately 130 feet in diameter. The eastern impoundment was rectangular and measured approximately 150 feet by 250 feet. The impoundments received spent pickling process wastes (for solar evaporation). The process wastes (approximately 35,000 gallons per month) included spent sulfuric acid, borax, soda ash, phosphates, and TURCO II H.T.C. soap. One of the State Industries impoundments is known to have leaked on three separate occasions in 1974, and a liner apparently ripped on one impoundment in 1980. The western impoundment was closed and covered by a warehouse in approximately 1983. The eastern impoundment was closed by 1988, which involved leaving the liner in place and mixing the contents with soil until the material solidified; an engineered protective cover may not have been

Table 7: Current Surface Impoundments and Former Surface Impoundments Identified at the Site in the ECA and/or LOU	
Impoundment	**Description**
	placed over this area. Sludge within the ponds was sampled prior to closure and found to be nonhazardous. The former State Industries, Inc. impoundments were designated as LOU-62 and are being addressed as part of RZ-A.

The Beta Ditch (Located On-Site and Off-Site)

The Beta Ditch consists of a series of unlined east-west drainage channels extending through the subject property and the larger BMI Complex. It was constructed in 1941/2 during construction of the BMI Complex by the U.S. Government. Initially, it originated at a storm sewer outfall on the subject property and extended to the east to a siphon location on the adjacent Timet property. The ditch was extended westward in 1970 to allow wastes from Stauffer and Montrose to be discharged. The downstream siphon transferred the waste under Boulder Highway to another unlined open surface ditch (the "Acid Ditch") that paralleled the southern margin of the Upper BMI Ponds. Flows were then routed to ponds within the Upper or Lower BMI Pond system via distribution ditches within the pond system.

Before 1976, the Beta Ditch was used to transfer a variety of liquid and slurried wastes originating from U.S. Government operations and the various operating companies and lessees in the BMI Complex, as well as storm water runoff, to the Upper and Lower BMI Ponds. Discharges into the Beta Ditch from the subject property included chlorate, perchlorate, and boron process wastes and related waste streams from cooling tower blowdown, boiler blowdown, and housekeeping washings. Additional contributors to process wastewater discharges to the portion of the Beta Ditch traversing the subject property included the U.S. Government, Stauffer, Montrose, U.S. Lime and Flintkote (now Chemstar), and State Industries. After 1976, the Beta Ditch generally was used only for the management of non-contact cooling water and storm water runoff, which were discharged to the Las Vegas Wash. However, it should be noted that Kerr-McGee experienced several cooling tower upsets, during which high conductivity water was discharged to the Beta Ditch (and in one upset condition in 1980, approximately 500,000 to 600,000 gallons of sodium chlorate process solution were discharged). During prior assessments, the Beta Ditch has been identified as a potential contaminant source (LOU-5). As discussed in Section 4.3, the Beta Ditch is being addressed under the current remedial program as RZ-E.

Current discharges to the Beta Ditch are regulated by NDEP in conjunction with Tronox's NPDES permit. The Beta Ditch is currently blocked by an earthen dam near the eastern end.

Off-Site Surface Water Bodies

In addition to the surface water bodies located wholly or partially on the subject property, as described above, a number of surface water bodies currently or historically have been located on adjacent properties. Many of these off-site surface water bodies have not been included in past investigations of the subject site, but rather are included in investigations of these adjacent off-site properties or of "common areas" being addressed collectively by the current owners/operators of the BMI Complex. However, two specific off-site surface water features were included in the subject property's ECA, namely the upper and Lower BMI Ponds (included in the ECA but not designated in the LOU) and the unnamed drainage ditch segment extending through the former BMI landfill (LOU-6), as briefly described below.

The unlined BMI ponds were located north-northeast of the BMI Complex in a large area between Boulder Highway, Leak Mead Drive, and the Las Vegas Wash. The Lower Ponds abutted Las Vegas Wash, whereas the Upper Ponds were positioned closer to the BMI Complex. The ponds appear to have been constructed in the early 1940s, once the four Trade Effluent evaporation/settling ponds were determined to be inadequate. The BMI ponds were designed to manage commingled industrial wastewater originating from the BMI Complex that was conveyed to the ponds via a system of open surface ditches and subsurface siphons. The BMI ponds were used by the subject property and various other entities within the BMI Complex from the early 1940s until the mid-1970s, when each of the operating companies was required to achieve "zero discharge" with regards to industrial wastewater management. According to the ECA, the extrapolated combined effluent discharged by WECCO, AP&CC, and Kerr-McGee to the BMI ponds prior to January 1976 is estimated at approximately 600,000 gallons per day. The aqueous waste streams discharged to the BMI ponds were generated from the manufacture of chlorates (containing hexavalent chromium), perchlorates, and boron products; discharges did not contain manganese dioxide process wastes.

The unnamed drainage ditch segment, also known as the Northwest Drainage Ditch, was used by more than one company in the BMI Complex. The segment was near the location of the former BMI Landfill (see Section 5.2.11).

5.2.10 Stained Soil or Pavement

Stained soil and pavement were noted during ENVIRON's site tour and prior environmental assessments, as would typically be expected for a facility used for heavy industrial activities over the course of nearly seventy years. Tronox is in the process of performing remedial activities to address contamination in areas not under active use, as described in Section 4.3. Ongoing remedial activities are summarized in Section 6.1.1.

5.2.11 Solid Waste Disposal Areas or Areas Filled by Non-Natural Causes

In addition to the wastewater disposal areas described above in Section 5.2.9, ENVIRON's review identified several former solid waste disposal areas located at the site, as summarized below. These solid waste disposal areas were identified during the prior assessments as

potential contaminant sources. Contamination concerns at the site are summarized in Section 6.1.1.

Former Hazardous Waste Landfill (LOU-10)

Kerr-McGee operated an on-site hazardous waste landfill between 1980 and 1983. The landfill consisted of an unlined subsurface cell (410 feet long by 45 feet wide by 20 feet deep) with a maximum capacity of approximately 332,000 cubic feet. The landfill was located near the west-central portion of the Tronox property in an area formerly occupied by one of the U.S. Government's Trade Effluent settling ponds. According to the ECA, this area had also been filled with material of an unknown origin at least between 1960 and 1979.

During its operation, the landfill received low level chromium-bearing mud from the sodium chlorate cells (an estimated 3,000 cubic yards in total). This mud (also referred to as sodium chlorate filter cake) was stabilized by mixing with an equal volume of soil. The landfill also reportedly received soil originating from the closure of Pond S-1, including the dry contents, the pond liner, and the underlying two feet (approximately 2,900 cubic yards total) of chromium-contaminated soil.

In 1985, the landfill was closed out and capped as a hazardous waste landfill pursuant to RCRA requirements (the material within the landfill was believed to be a hazardous waste due to the presence of chromium, although it is unclear whether chemical analyses were performed at that time to confirm this designation). An engineered cover system was installed that contained layers of low permeability compacted clay, a synthetic membrane, and compacted granular soil. NDEP approved the closure of the hazardous waste landfill in a letter dated January 17, 1986. The landfill subsequently was operated under post-closure care pursuant to a closure/post-closure care plan approved by NDEP. Post-closure activities included periodic inspection and maintenance of the cap, annual elevation check of settlement benchmarks, and periodic groundwater monitoring of four monitoring wells surrounding the landfill.

More recently, Tronox's consultant performed two rounds of sampling to characterize the contents of the landfill in August and September 2010. Based on the sampling results, the consultant concluded that the wastes within the landfill were not listed or characteristic hazardous wastes under RCRA. Subsequently at the end of 2010, Tronox excavated the waste material from the landfill and disposed of it off-site as nonhazardous waste.

Nonhazardous Manganese Tailings Area (LOU-24)

Until the end of 2010, Tronox maintained a manganese tailings area directly north of the manganese dioxide Leach Plant near the east-central portion of the Tronox site. Manganese tailings had been placed in this area since beneficiation of manganese dioxide ore was initiated by WECCO in 1951. Between 1951 and 1975, tailings from the beneficiation of manganese dioxide ores were sluiced to unlined surface impoundments/leach beds in this area. The sluicing water either evaporated or

percolated, leaving behind the solids. Beginning in 1975, manganese tailings were filtered (using a rotating drum filter press) to yield a semi-dry, solid filter cake waste. This dewatered filter cake (referred to as manganese tailings) was landfilled on top of the same area previously used as leach beds. Disposal of manganese tailings in this area was regulated by NDEP, and there were approximately 213,000 cubic yards of material in this area when it stopped being used. The manganese tailings contained trace heavy metal sulfides, silica, paraffin wax, and calcium sulfate; they had been sampled and found to be nonhazardous. In late 2010, Tronox completed the excavation of manganese tailings in this area for off-site disposal.

Former Manganese Tailings Areas (LOU-34)

Near the east-central portion of the Tronox site are two areas where manganese tailings (see description of the material under the discussion of LOU-24) were placed sometime between 1950 and 1979 in conjunction with the manganese dioxide beneficiation process. The western former tailings area is immediately west of LOU-24 and directly north of the Chemstar operation. The eastern former tailings area is approximately 300 feet south of LOU-24 and north of Unit 6. Some of the tailings placed within the western area appear to have been removed to facilitate construction of surface impoundments P-1 and S-1 in 1972 and 1974, respectively. Also, certain tailings were removed from the southern portion of the western area and relocated to LOU-24 in approximately 1989.

Truck Emptying/Dump Site (LOU-35)

The ECA identified an open area within a depression on Tronox's western property boundary (approximately 800 to 1,300 feet northwest of Unit 1) where solid wastes/materials were periodically discarded between 1969 and 1991. The open area is approximately 480 feet long (north-south) by 320 feet wide (east-west). The composition of the wastes deposited in this area is unknown. Apparently, trucks entered the area and deposited remnants of the various substances (e.g., soda ash, lime) that they had hauled. No additional information is known about this area, except that limited soil sampling performed in this area in the 1990s did not identify significant adverse impacts.

Manganese Ore Piles (LOU-47)

Manganese ore (typically approximately one-half to one inch in diameter) processed on-site since 1951 was historically stored in piles located in a rectangular-shaped area near the Leach Plant. As a result of historical operational activities, manganese ore has been scattered on the ground throughout the Leach Plant area. The unprocessed ore is comprised of greater than 55% (by weight) manganese dioxide and, according to the ECA, is not readily soluble in water. As such, the ECA concluded that it would not be expected to significantly leach into surface water or the underlying groundwater.

In addition to the solid waste disposal areas located on-site, the ECA presented information regarding the BMI landfill, which was located near the central portion of the BMI Complex in an area formerly used as a Trade Effluent pond during the U.S. Government era operations. No detailed information regarding the design, operation, and closure of the BMI landfill was located by ENVIRON. According to the ECA, BMI began operating this landfill area in May 1952,

although solids wastes may have been placed in this area before 1950. Through 1970, solid waste was disposed of in open pits and periodically burned. Between 1970 and 1979, solid wastes were disposed in trenches and pits within the landfill (approximately 12 to 24 feet wide, up to 400 feet long, and up to 20 to 24 feet deep) and covered. A number of different operating companies (including Kerr-McGee and its predecessor companies) sent solid and liquid wastes to the landfill. Kerr McGee primarily sent the following types of wastes to the landfill: housekeeping wastes (e.g., paper, cartons, bags, pallets, drums, and plastics), asbestos-containing material, elemental carbon powder (from boron operations), filter cake from the sodium chlorate operations, and dried residues from the cleaning of surface impoundments P-1 and AP-2. The BMI landfill was closed in February 1980, which involved covering solid waste areas with two to fifteen feet of waste lime and a minimum of two feet of soil, grading, and restricting access. Although the BMI Landfill was included within NDEP's LOU (designated LOU-6), it is being addressed as a common area within the BMI Complex and therefore is not covered within this Phase I ESA.

5.2.12 Wastewater

Currently, sanitary wastewater generated at the site is discharged to the municipal sanitary sewer system, except at restrooms near the groundwater treatment facility on the northwestern portion of the site that discharge to an active septic system (see Section 5.2.14 below). The City of Henderson, Department of Utility Services has issued a waste discharge authorization to the collective BMI companies for discharge of sanitary effluent from each facility.

With regards to industrial wastewater, Tronox has been a "zero discharge" facility since 1976. Process wastewaters are conveyed throughout the facility by a system of surface and subsurface pipelines to on-site surface impoundments (see Section 5.2.9). From there, the wastewaters are reused or allowed to evaporate. Before 1976, the facility discharged industrial wastewater into various surface water bodies, as detailed in Section 5.2.9.

Storm water discharges from the Tronox facility, as well as non-contact cooling water, are discharged via the Beta Ditch to Las Vegas Wash pursuant to a NPDES storm water permit. Storm waters at the site and within the larger BMI Complex are conveyed through a network of concrete and clay tile storm drains, manholes, and outfalls initially constructed in 1941/2. As detailed in Section 5.2.9 above, process wastewater also was historically conveyed via this system from approximately 1941 to 1976. Prior site assessments (see Section 4.3) identified the storm sewer system as a potential contamination concern (LOU-59). Contamination concerns at the site are summarized in Section 6.1.1.

5.2.13 Wells

Monitoring wells are located throughout the Tronox site. In addition, Tronox operates a series of on-site and off-site groundwater extraction wells associated with its groundwater remediation systems. The monitoring and extraction wells are maintained to address groundwater contamination from historical operations of the site and nearby properties. Tronox maintains various water appropriations permits for the remedial activities. Additional discussion of the groundwater contamination is presented in Sections 4.3 and 6.1.1 of this report.

5.2.14 Septic Systems or Cesspools

There is one active septic system at the site that services the restrooms near the groundwater treatment facility on the northwestern portion of the site. Historically, this area was associated with the dry ammonium perchlorate blending process. According to facility personnel, this active septic system has been used only for disposal of sanitary wastewater.

In addition to the active septic system, two former septic systems are known to have been operated on-site. One former septic system serviced a restroom in the crystallization building in the former ammonium perchlorate processing area; this septic system reportedly has been used only for disposal of sanitary wastewater. The other septic system formerly serviced the change house building associated with the ammonium perchlorate plant. This building was constructed in the early 1950s, and a chemistry laboratory was operated within the building beginning in 1980. Until 1992, wastewater effluent from showers, restrooms, and the laboratory sinks discharged to the septic system and leach field located adjacent to the building. Laboratory discharges to the septic system included rinsate from laboratory utensils, instruments, and equipment used for the preparation of standards; caustic and acid solutions for pH determinations; and dilute titrants (including formaldehyde).

The active septic system and the former septic system in the crystallization building reportedly only received sanitary discharges, and therefore they have not been identified as significant potential contamination sources. The septic system servicing the change house building was identified in the ECA and the LOU as a potential contamination concern (LOU-54). However, it should be noted that soil sampling from the former septic system leach field performed in the 1990s did not identify significant impacts from total metals, soil pH, VOCs, and SVOCs in this area. Contamination concerns at the site are summarized in Section 6.1.1.

6 Findings, Opinion, and Conclusions

ENVIRON performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-05 of the Tronox property located in Clark County, Nevada in December 2010. Any exceptions to, or deletions from, this practice are described in Section 6.3.

6.1 Findings and Opinion

6.1.1 Recognized Environmental Conditions

This assessment has revealed no evidence of RECs, as defined by ASTM (see Chapter 2.0), in connection with the property, except for the following:

- **Identified On-Site Contamination Related to Historical Site Operations.** As detailed in Section 4.3 of this report, past site operations have resulted in adverse impacts to site groundwater, soil, and soil gas. Contamination originating on the subject property has also impacted off-site groundwater in a downgradient direction and downstream surface water bodies. The identified contamination is being addressed under the oversight of the NDEP.

  With respect to groundwater, the primary constituents of concern are hexavalent chromium and perchlorate. Tronox is currently employing several on-site and downgradient groundwater extraction and treatment systems (as well as use of a slurry wall) to address the contaminant plume originating on-site. These remedial technologies have resulted in significant decreases in contaminant migration to downgradient and downstream receptors, although contaminant levels remain above established regulatory standards. Currently, Tronox is evaluating enhancements to the active groundwater remediation systems.

  Past site investigations have identified a number of constituents in site soils above regulatory standards, including dioxin, hexachlorobenzene, other SVOCs, PCBs, asbestos, metals, OCPs, and perchlorate. In 2010, Tronox undertook a remediation program to excavate source areas present within the top ten feet of soil in five remediation zones encompassing most of the current and former operating areas of the site. This source area remediation effort is still underway. Where impacted soils within the remediation zones cannot be investigated and/or excavated due to Tronox's operations at the site (e.g., beneath the active Unit Buildings and the Leach Plant), further actions will likely not be required so long as the facility remains operational. Tronox is in the process of implementing Institutional Controls/ Environmental Covenants to prevent exposure to residual contaminants in certain areas originally designated for excavation where, due to physical constraints or other access issues, residual contamination may remain in place. Tronox is also evaluating the feasibility of *in situ* soil remediation technologies to address residual perchlorate contamination in the deeper portions of the vadose zone in some of these areas. In addition, on-site soils along the northern, western, and southern edges of the site (outside the boundaries of the aforementioned remediation zones) are being investigated and remediated by several other entities separately from Tronox's investigations.

Site-wide evaluations of soil gas recently performed in 2008 through 2010 identified elevated concentrations of VOCs in soil gas within specific areas of the site that present a potential indoor air risk in excess of NDEP's "point of departure" risk levels. As such, risk management activities may be needed for existing buildings and future construction to mitigate vapor intrusion concerns.

The identified impacts to on-site groundwater, soil, and soil gas related to historical site operations represent a Recognized Environmental Condition.

- **Identified On-Site Contamination from an Off-Site Source.** A groundwater contaminant plume (primarily chlorinated VOCs, pesticides, and metals) has migrated onto the subject site from the adjacent property to the west. The responsible parties for this groundwater plume are operating a groundwater treatment system and performing groundwater monitoring under NDEP oversight, but DNAPL and significant concentrations of dissolved-phase contaminants remain present beneath the Tronox site. The contamination originating from off-site may be contributing to the on-site vapor intrusion concerns described above. Additional information regarding on-site contamination associated with off-site sources is presented in Section 4.3 of this report. The presence of subsurface contamination originating from off-site sources represents a Recognized Environmental Condition.
- **Closure of On-Site Surface Impoundment AP-5.** Pursuant to an Administrative Order on Consent entered into between NDEP and Tronox's predecessor company (Kerr-McGee) in April 2005, Tronox is required to decommission on-site surface impoundment AP-5. The approximately 10.9-acre, lined impoundment was historically used to contain ammonium perchlorate-containing solutions. Decommissioning activities are planned for 2011, which will involve dewatering the pond (with effluent discharged to a different on-site surface impoundment), removing the solids for off-site disposal (following dewatering), and excavation of the underlying liner. During this process, any identified contamination underlying the pond would also be addressed in accordance with NDEP requirements. Given that AP-5 decommissioning activities are being required by NDEP to avert any further threat of a release of perchlorate to the environment, ENVIRON considers this matter to represent a Recognized Environmental Condition until decommissioning activities are completed.

Because all of the Recognized Environmental Conditions identified above are currently known to NDEP and are actively being investigated and addressed under the Division's oversight, ENVIRON does not recommend additional investigation or remedial actions separate and apart from the ongoing activities described above at this time.

6.1.2 Significant Data Gap Issues

The ASTM Standard defines a data gap as "a lack of or inability to obtain information required by the practice despite good faith efforts by the environmental professional to gather such information." A data gap is only significant if other information obtained during the ESA, or professional experience, raises reasonable concerns and affects the ability of the environmental professional to identify whether a given issue is a REC. The ASTM Standard requires that the ESA report identify and comment on significant data gaps.

ENVIRON did not identify any significant data gaps during the course of this assessment.

6.1.3 Historical Recognized Environmental Conditions

In addition to the RECs described above, ENVIRON identified the following issue that has been addressed to the satisfaction or regulatory authorities and therefore is not considered a current REC:

- **Sale Parcels A and B.** As detailed in Section 4.3 of this report, the northern, western, and southern edges of the site, which are not within the boundaries of the aforementioned remediation zones, have been designated as Sale Parcels A through J. Investigation and (as needed) remediation of the Sale Parcels is being performed by several entities on a separate timeline from the ongoing activities in the remediation zones. In correspondence dated April 8, 2008, NDEP issued a No Further Action letter for Parcels A and B, and no additional investigation or remediation activities are planned for these areas. As such, Sale Parcels A and B are no longer considered to represent a REC.

6.1.4 *De Minimis* Conditions

De minimis conditions are those that do not represent a material risk of harm to public health or the environment and that generally would not be the subject of enforcement action if brought to the attention of appropriate governmental agencies. During ENVIRON's site tour and prior environmental assessments, stained flooring, pavement, and soil were observed at the site, as would typically be expected for a facility used for heavy industrial activities over the course of nearly seventy years. In addition, current and past site operations have involved use of various chemicals and features (e.g., sumps, underground lines, tanks) that could potentially result in subsurface contamination. Areas of significant environmental concern throughout the site are being addressed by Tronox and/or other entities under NDEP oversight, as described in Section 6.1.1 above. Those limited portions of the site that are not the subject of further investigation and/or remediation under the framework described above are considered to be *de minimis* concerns.

6.2 Conclusions

ENVIRON has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527 of the Tronox facility located in Clark County, Nevada. Any exceptions to, or deletions from, this practice are described in Section 6.3 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property, except for those described in Section 6.1.

6.3 Analysis of Data Gaps

Site reconnaissance deviations, deletions, limitations, and exceptions, to the ASTM Standard for the assessment are discussed below.

- The site has been owned and operated by a number of entities during its long industrial history. Facility personnel did not have current contact information for the representatives of the former site occupants, and thus ENVIRON was unable to interview historical site representatives about historical operations and site conditions. However, past

environmental assessments reviewed by ENVIRON (in particular the ECA) contained detailed information about past site operations by prior owners/operators.

- ENVIRON has repeatedly requested but not yet received certain site-specific information from the Health Department and the Clark County Fire Department.
- Historical information reviewed directly by ENVIRON, such as aerial photographs, was not readily available to characterize the property from the present back to the property's obvious first developed use or 1940, whichever is earlier. The earliest readily available historical source that would indicate specific site uses that was reviewed by ENVIRON was an aerial photograph dated 1950, which shows the site was already developed with a large industrial facility. Older historical information was summarized within the ECA report, which was reviewed by ENVIRON.
- Because the site has been extensively investigated under the purview of the NDEP since the 1980s, it was determined that only duplicative information would be provided in a User Questionnaire consistent with Appendix X3 of the ASTM Standard. Therefore, a User Questionnaire was not prepared as part of this assessment.
- As it is a user requirement, ENVIRON did not conduct an independent review of records to identify environmental liens or AULs imposed by judicial authorities with respect to the property.

None of the exceptions, deletions, deviations, or site reconnaissance limitations noted above are considered to represent significant data gaps.

7 References

7.1 Documents

EDR. 2010. "Aerial Photography Print Service: Inquiry Number 2938729.5." December 9.

EDR. 2010. "City Directory, Abstract, Inquiry Number 2938729.6." December 9.

EDR. 2010. "Historical Topographic Map Report, Inquiry Number 2938729.4." December 7.

EDR. 2010. "Radius Map, Inquiry Number: 02938729.2r." December 7.

EDR. 2010. "Sanborn® Map Report, Inquiry Number 2938729.3." December 7.

ENSR International. 2005. *Conceptual Site Model, Kerr-McGee Facility, Henderson, Nevada*. February.

Hargis + Associates, Inc. 2010. *2010 Comprehensive Groundwater Data Evaluation Report, Former Montrose and Stauffer Facilities, Henderson, Nevada, Revision 1.0*. September 21.

Kleinfelder, Inc. 1993. *Environmental Conditions Assessment, Kerr-McGee Chemical Corporation, Henderson, Nevada Facility*. April.

Nevada Division of Environmental Protection. 1994. *Phase II Letter of Understanding Between NDEP and Kerr-McGee Chemical Corporation (KMCC)*. August 15.

Nevada Division of Environmental Protection. 2009. *Order.* December 14.

Nevada Division of Environmental Protection and Kerr McGee Chemical Corporation. 1986. *Consent Order*. September 9.

Nevada Division of Environmental Protection and Kerr McGee Chemical Corp. 1996. *Consent Agreement*. August 12.

Nevada Division of Environmental Protection and Kerr-McGee Chemical LLC. 1999. *Consent Agreement*. July 26.

Nevada Division of Environmental Protection and Kerr-McGee Chemical LLC. 2001. *Administrative Order on Consent*. October 8.

Nevada Division of Environmental Protection and Kerr-McGee Chemical LLC. 2005. *Administrative Order on Consent*. April 12.

Nevada Division of Environmental Protection and Chemstar, Inc., Kerr-McGee Chemical Corporation, Montrose Chemical Corporation of California, Inc., Pioneer Chlor Alkali Company, Inc., Stauffer Management Company, Inc., and Titanium Metals Corporation. 1991. *Consent Agreement*. April 25.

Northgate Environmental Management, Inc. 2010. *Removal Action Work Plan for Phase B Soil Remediation of Remediation Zones RZ-B through RZ-E, Tronox LLC, Henderson, Nevada*. June 22.

Northgate Environmental Management, Inc. and Exponent, Inc. 2010. *Site-Wide Soil Gas Human Health Risk Assessment, Tronox LLC, Henderson, Nevada*. November 22.

Northgate Environmental Management, Inc. and Exponent, Inc. 2010. *Closure and Post-Remediation Screening Health Risk Assessment Report for Parcels C, D, F, G, and H, Tronox LLC, Henderson, Nevada*. December 10.

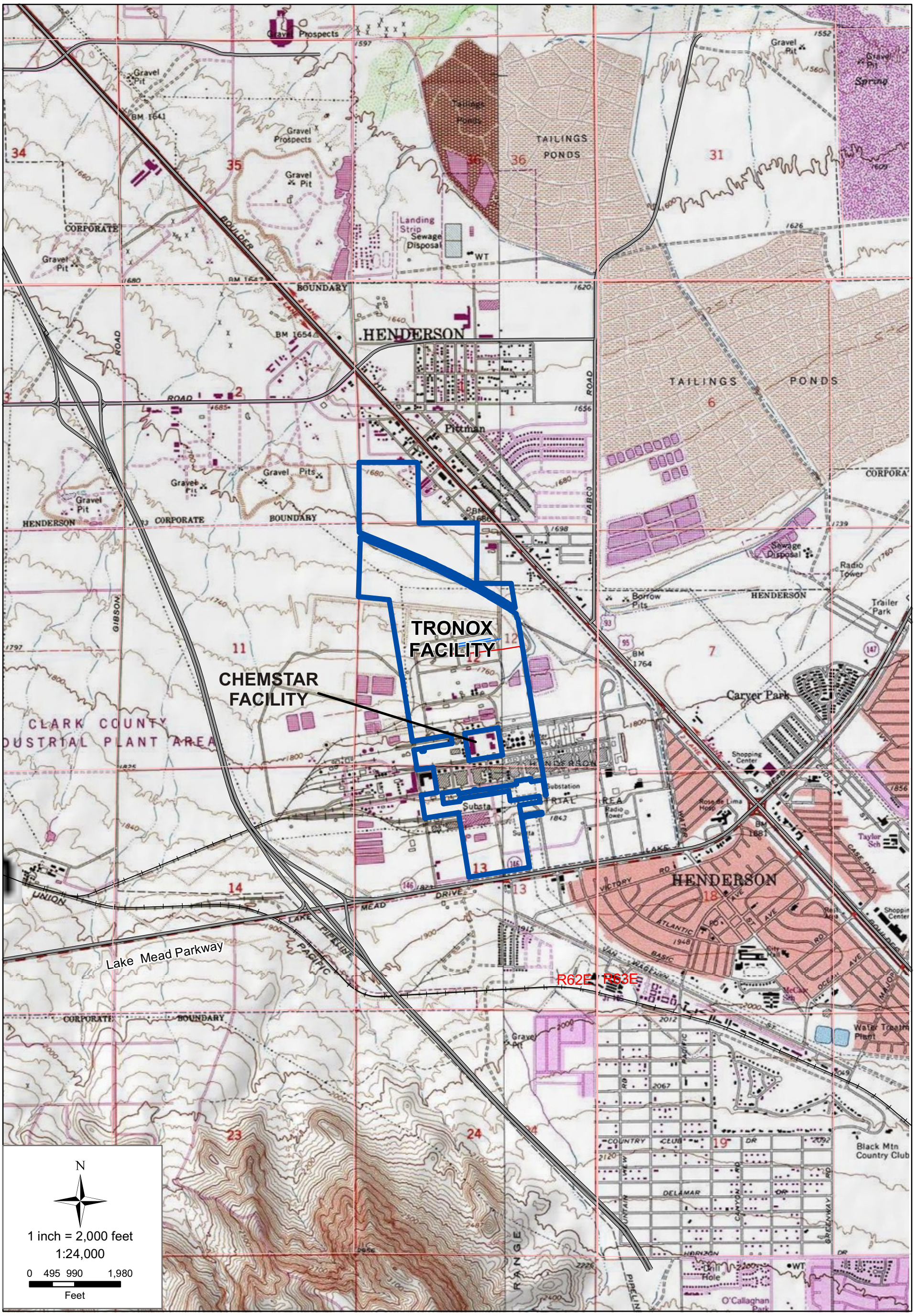
7.2 Interviews

Susan Crowley. Crowley Environmental LLC (a contractor for Tronox). 2010. Personal interview. December 14.

Keith Baily. Environmental Answers LLC (contractor for Tronox). 2010. Personal Interview. December 14.

Figures

Q:\DRAWINGS\2126210A\2126210A-FIG1.CDR



ENVIRON

Site Location Map
Tronox LLC
Clark County, Nevada

Figure
1

Drafter: RS | Date: 1/7/11 | Contract Number: 21-26210A | Approved: | Revised:

ENVIRON

Site Vicinity Layout
Tronox LLC
Clark County, Nevada

Figure
2

Drafter:	RS	Date:	1/7/11	Contract Number:	21-26210A	Approved:		Revised:	

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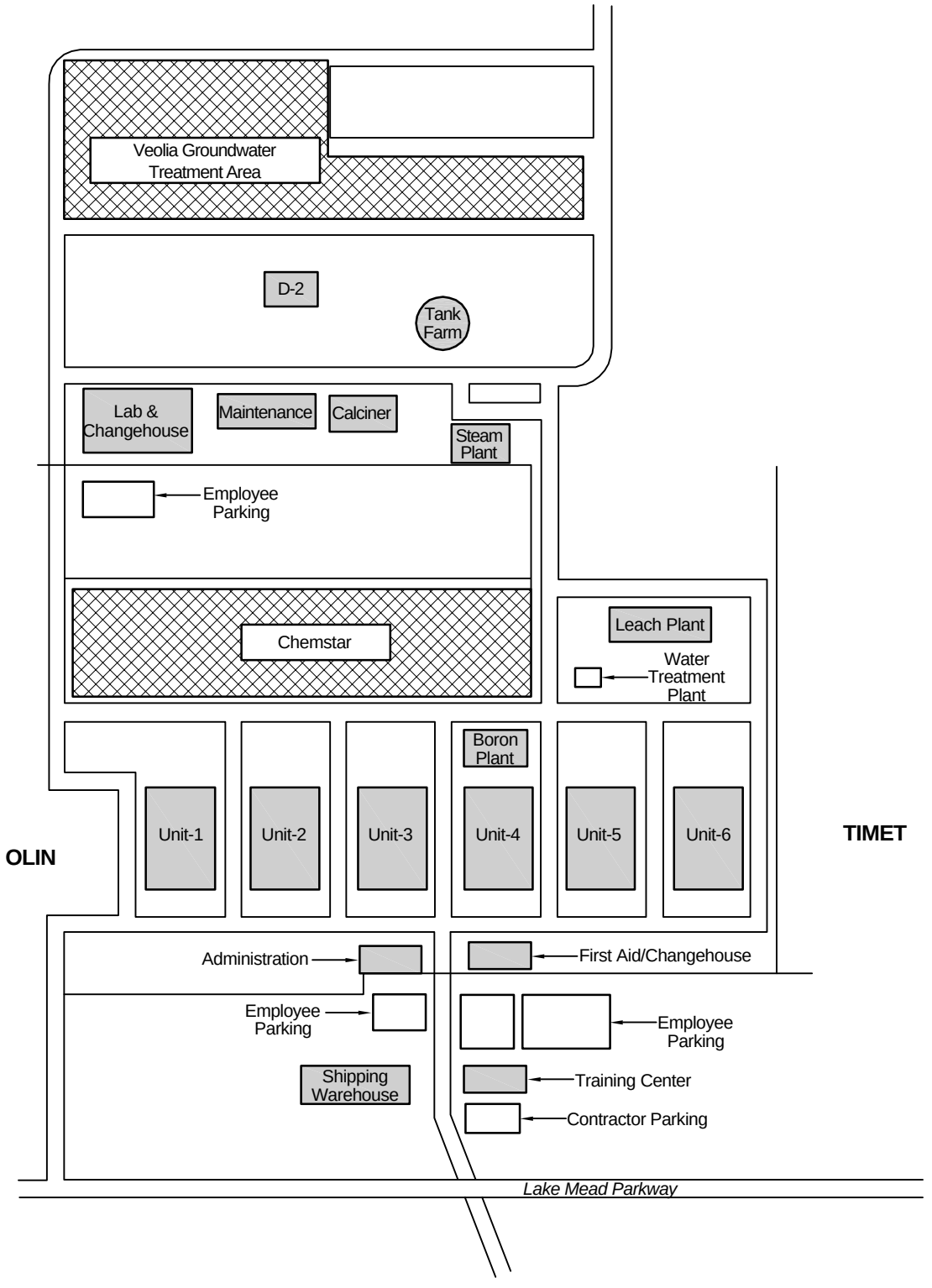

NOT TO SCALE

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ENVIRON

Site Buildings
Tronox LLC
Clark County, Nevada

Figure
3

Drafter: RS | Date: 1/7/11 | Contract Number: 21-26210A | Approved: | Revised:

Q:\DRAWINGS\2126210A\2126210A-FIG4.CDR

BMI COMMON AREA DISPOSAL
(UPPER & LOWER BMI PONDS)

(NE CORNER OF PROPERTY)

OPERATIONS BY:

DELBERT MADSEN & ESTATE OF
DELBERT MADSEN. (2 ACRES)
LOU #67

SOUTHERN NEVADA AUTO PARTS (SNAP)
AREA (10 ACRES)
LOU #68

DILLON POTTER SITE (2 ACRES)
LOU #69

ON-SITE HAZARDOUS WASTE
LANDFILL (CLOSED)
LOU #10

SB1-6

SB1-5

SB1-7

TRADE EFFLUENT
SETTLING PONDS
LOU #1

POND WC-1
LOU #22

WC-WEST
WC-1

POND WC-2
LOU #23

WC-EAST
WC-2

SB1-4

SB1-3

UNNAMED DRAINAGE
DITCH SEGMENT
(BML LANDFILL)
LOU #6

BLDG E-6

BLDG E-4

GROUNDWATER REMEDIATION UNIT (AREA)
LOU #32

GROUNDWATER
BARRIER WALL

AREA AFFECTED BY
JULY 1990 FIRE
LOU #55

BLDG E-3

BLDG E-2

BLDG E-1

LOADING DOCK

RAIL ROAD TRACKS

TREATMENT UNIT

SB1-2

OPEN AREA DUE SOUTH
OF TRADE EFFLUENT
DISPOSAL PONDS
LOU #2

NEW D-1 BLDG

AP PLANT AREA NEW
BLDG D-1 WASHDOWN,
AP TRANSFER LINES TO
SODIUM CHLORATE PROCESS
LOU #58

DRUM RECYCLING AREA
LOU #31

OLD D-1 BLDG

SB1-1

M-25

AP AREA PAD
LOU #30

CONT. TRENCH PAD

AP PLANT
AREA OLD BLDG
D-1 WASHDOWN
LOU #56

AP-5 POND

LOU #19

NEW AP-6 POND

BETA DITCH

BENCHMARK – BM2
LATITUDE – 36°02'50.35"N
LONGITUDE – 115°00'01.62"W
ALTITUDE – 1,765.220 FT

AP PLANT SI's AND
TRANSFER LINES
TO/FROM AP SI's
LOU #57

M-89

AP-1 POND

LOU #16&17

AP-2 POND

LOU #16&17

AP-4 POND

LOU #18

C-1 POND

LOU #20

BETA DITCH
& SMALL DIVERSION DITCH
LOU #5

AP PLANT AREA
TANK FARM
LOU #53

MCC

LOU #16&17

AP-3 POND

M-17

LOU #21

MW-1 POND

AP PLANT CHANGE
HOUSE/LAB
SEPTIC TANK
LOU #54

AP PLANT AREA SCREENING
BUILDING, DRYER
BUILDING & ASSOC. SUMP
LOU #52

DRYER BLDG

D-2 BLDG

D-BLDG

LUNCH SHACK

RAIL ROAD TRACK

SB6-1

SB6-2

FORMER OLD MAIN COOLING TOWER
& RECIRCULATION LINES
LOU #46

LEACH BEDS, AND
MANGANESE TAILINGS AREA
LOU #24

STEAM PLANT

SB8-1S

AP MAINT. SHOP

LAB, AP OFFICES & CHANGE HOUSE

LAB STORAGE

SATELLITE
ACCUMULATION POINT/
AP MAINTENANCE SHOP
LOU #39

NEW P-2 POND
LOU #9

P-2

S-1 CLOSED

POND S-1
LOU #13

SB2-8

SB2-2

SB2-13

SB2-7

SB2-11

SB2-10

P-1 CLOSED

POND P-1
LOU #14

LEACH PLANT AREA
LEACH TANKS
LOU #50

LEACH PLANT AREA
SULFURIC ACID STORAGE
LOU #49

FORMER SATELLITE
ACCUMULATION POINT,
AP-LABORATORY
LOU #38

OLD P-3 POND
LOU #8

P-3 CLOSED

P-2 CLOSED

SB2-9

SB2-12

M-21

SB2-1

SB2-3

SB2-6

SB2-4

SB2-5

LEACH PLANT
ANALYTE TANKS
LOU #48

SB5-1

SB5-2

SB5-3

DIESEL TANK

TRUCK EMPTYING/
DUMPING SITE
LOU #35

OLD P-2 POND
LOU #7

OPERATIONS BY KOCH
MATERIALS CO.
LOU # 64

SB4-1

SB4-2

SB4-3

SB4-4

SB4-5

SB4-6

SB4-7

SB4-8

AVENUE F

TIMET

FORMER MANGANESE
TAILINGS AREA, WESTERN
LOU #34

DIESEL STORAGE
TANK
LOU #45

LEACH PLANT AREA
TRANSFER LINES
(TO/FROM UNIT 6)
LOU #51

11TH STREET

LEACH PLANT
AREA MANGANESE
ORE PILES
LOU #47

FORMER MANGANESE TAILINGS
AREA, EASTERN
LOU #34

ACID DRAIN
SYSTEM
LOU #60

AVENUE F

BENCHMARK – BM1
LATITUDE – 36°02'34.83"N
LONGITUDE – 114°59'58.45"W
ALTITUDE – 1,812.660 FT

NEVADA PRECAST
CONCRETE PRODUCTS
LOU #65

SB-7

M-97

CHEMSTAR PROPERTY

AVENUE G

STORM SEWER
SYSTEM
AREA
LOU #59

J.B. KELLEY, INC
TRUCKING SITE
(CONCRETE VAULTS)
LOU #63

ABOVE-GROUND DIESEL
STORAGE TANK, LEASED BY
FLINTKOTE COMPANY
LOU #66

FORMER
AST

HAZARDOUS WASTE
STORAGE AREA
LOU #12

FORMER SATELLITE ACCUMULATION POINT,
UNIT-6, MAINTENANCE SHOP
LOU #37

HARDESTY CHEMICAL
COMPANY SITE
LOU #4

TRASH STORAGE AREA
LOU #26

EBONY CONSTRUCTION CO.
LOU #65

AVENUE G

SODIUM CHLORATE FILTER
CAKE HOLDING AREA
LOU #11

PLATINUM DRYING UNIT
LOU #15

OLD SODIUM CHLORATE
PLANT DECOMMISSIONING
LOU #61

UNIT 6 BASEMENT
LOU #44

UNIT-8
(TIMET)

UNIT-7
(TIMET)

FORMER
UST SITE

HAZARDOUS WASTE
STORAGE AREA
LOU #28

UNIT-6

UNIT 4 & 5 BASEMENTS
LOU #43

UNIT-5

UNIT-4

11TH STREET

12TH STREET

10TH STREET

9TH STREET

UNIT 1
TENANT STAINS
LOU #41

SB9-1S(A)
SB9-1S(B)

PCB STORAGE AREA
LOU #27

UNIT-3

LOCATION OF A PORTION
OF FORMER HARDESTY
FACILITY

UNIT-2

AVENUE H

OPERATIONS BY:
BUCKLES CONSTRUCTION CO.
LOU #65

UNIT-1

4TH STREET

5TH STREET

6TH STREET

7TH STREET

8TH STREET

R R TRACK #10

SAFETY &
MEDICAL CLINIC

SODIUM PERCHLORATE PLATINUM
BY-PRODUCT FILTER, UNIT 5
LOU #33

SOLID WASTE DUMPSTER
LOU #29

PCB TRANSFORMER SPILL
LOU #40

GASOLINE
TANK

ADMINISTRATION

FORMER SATELLITE ACCUMULATION
POINT, UNIT-3, MAINTENENCE SHOP
LOU #36

PROCESS HARDWARE
STORAGE AREA (BETWEEN
UNITS 1 & 2)
LOU #25

UNIT 2 SALT REDLER
LOU #42

FACILITY BACKGROUND
MONITORING WELL

CONTROL
HOUSE

S-3

GREEN VENTURES
INTERNATIONAL
LOU #65

STATE INDUSTRIES, INC. SITE
(KMCC TENANT)
LOU #62

KMCC
PURCHASING

EXPLANATION:

- TRONOX PROPERTY BOUNDARY
- RAILROAD TRACKS
- BETA DITCH
- LOU#19 — ITEMS IDENTIFIED BY NEVADA DIVISION OF ENVIRONMENTAL PROTECTION IN THE 1994 LETTER OF UNDERSTANDING (LOU)
- [NOT SHOWN] — LOU #3 - AIR POLLUTION EMISSIONS ASSOCIATED w/ INDUSTRIAL PROCESSES
- SI — SURFACE IMPOUNDMENT

0 200' 400' 600'

1 INCH = 200 FEET

N

ENVIRON

Source Areas Identified in the LOU
Tronox LLC
Clark County, Nevada

Figure
4

Drafter: RS Date: 1/7/11 Contract Number: 21-26210A Approved: Revised:

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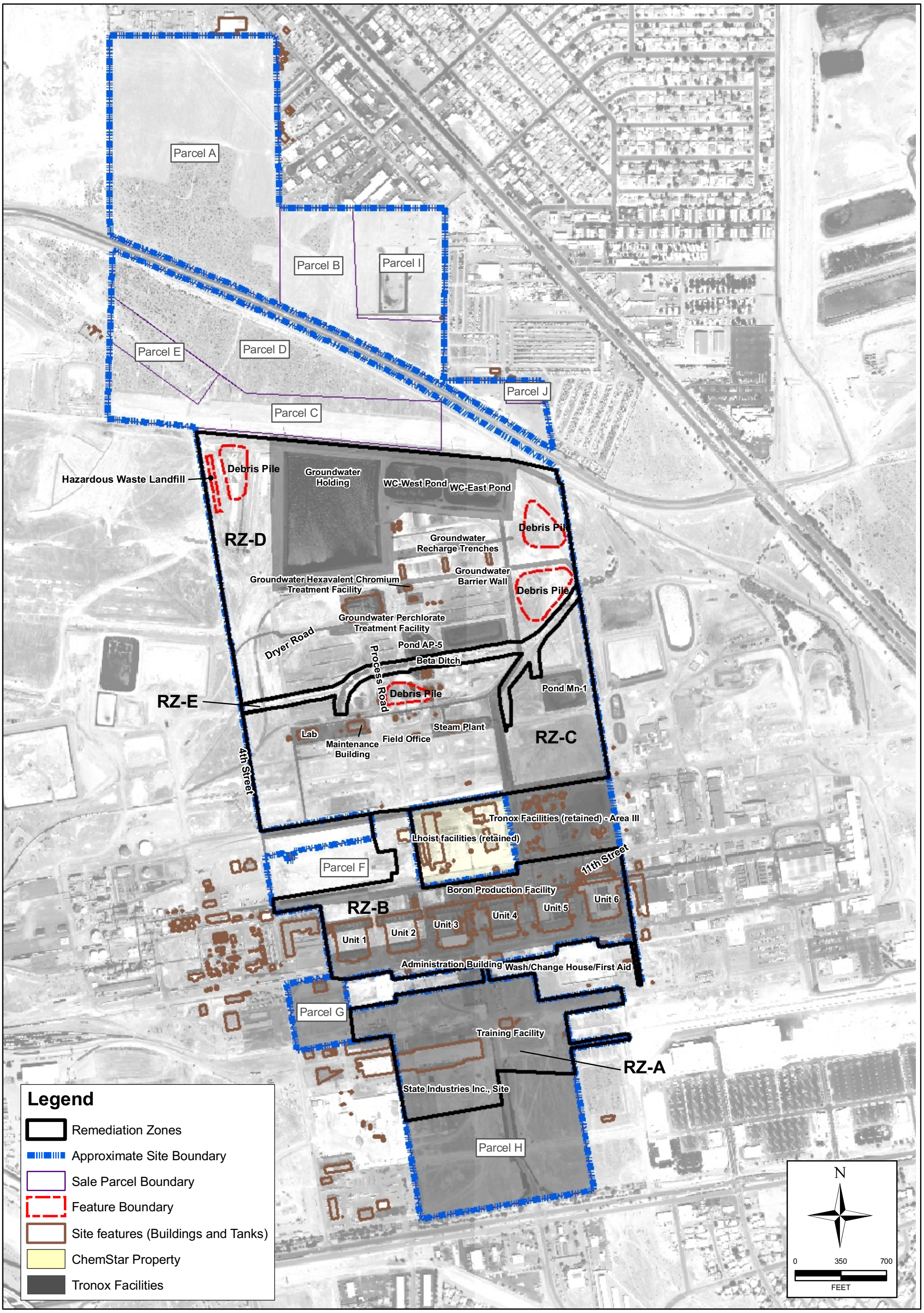

ENVIRON

Parcels and Remediation Zones for Soil Remediation
Tronox LLC
Clark County, Nevada

Figure **5**

Drafter: RS | Date: 1/7/11 | Contract Number: 21-26210A | Approved: | Revised:

ENVIRON

Groundwater Extraction Systems
Tronox LLC
Clark County, Nevada

Figure
6

Drafter:	RS	Date:	1/7/11	Contract Number:	21-26210A	Approved:	Revised:

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Appendix A

Environmental Database Report

Because the environmental databases themselves are sometimes not updated by the specific regulatory agencies for a period of up to one year or more (depending on the database and the agency), the database search conducted herein will not necessarily list any facility or site recently identified as having, or which is suspected of having, environmental problems and/or for which an environmental investigation/ listing has been initiated, or reflect the current status of activities at a particular site, subsequent to the last update of a given list. In addition, the EDR database search contained a number of unmapped sites. It was beyond the scope of this review to locate each of the unmapped sites.

Tronox
560 W Lake Mead Parkway
Henderson, NV 89015

Inquiry Number: 02938729.2r
December 07, 2010

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

560 W LAKE MEAD PARKWAY
HENDERSON, NV 89015

COORDINATES

Latitude (North):	36.044500 - 36° 2' 40.2''
Longitude (West):	115.001300 - 115° 0' 4.7''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	680052.4
UTM Y (Meters):	3990532.0
Elevation:	1800 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	36115-A1 LAS VEGAS SE, NV
Most Recent Revision:	1984
East Map:	36114-A8 HENDERSON, NV
Most Recent Revision:	1983

AERIAL PHOTOGRAPHY IN THIS REPORT

Photo Year:	2006
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL---------- National Priority List

EXECUTIVE SUMMARY

Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing

Federal institutional controls / engineering controls registries

US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Landfill List

State and tribal leaking storage tank lists

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

AST ---------- Aboveground Storage Tank List
INDIAN UST ---------- Underground Storage Tanks on Indian Land
FEMA UST ---------- Underground Storage Tank Listing

State and tribal voluntary cleanup sites

VCP ---------- Voluntary Cleanup Program Sites
INDIAN VCP ---------- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ---------- Project Tracking Database

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---------- Open Dump Inventory
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

EXECUTIVE SUMMARY

Local Lists of Hazardous waste / Contaminated Sites

US CDL	Clandestine Drug Labs
US HIST CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information
LUCIS	Land Use Control Information System

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System

Other Ascertainable Records

DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
NPDES	Permitted Facility Listing
AIRS	Permitted Airs Facility Listing
HMRI	Hazardous Materials Repository Information Data
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Sleam-Electric Plan Operation Data
PCB TRANSFORMER	PCB Transformer Registration Database

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants
EDR Historical Cleaners	EDR Proprietary Historic Dry Cleaners

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

EXECUTIVE SUMMARY

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal CERCLIS list

CERCLIS: The Comprehensive Environmental Response, Compensation and Liability Information System contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the CERCLIS list, as provided by EDR, and dated 01/29/2010 has revealed that there is 1 CERCLIS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PIONEER AMERICAS, LLC DBA OLIN	***8000 LAKE MEAD PARKWAY***	***0 - 1/8 (0.000 mi.)***	***A1***	***7***

Federal CERCLIS NFRAP site List

CERC-NFRAP: Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

A review of the CERC-NFRAP list, as provided by EDR, and dated 06/23/2009 has revealed that there are 3 CERC-NFRAP sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TITANIUM METALS CORPORATION	***8000 E LAKE MEAD***	***0 - 1/8 (0.000 mi.)***	***A3***	***21***
TRONOX LLC	***8000 W LAKE MEAD DR***	***0 - 1/8 (0.000 mi.)***	***A6***	***34***
MONTROSE CHEMICAL CORPORATION	***LAKE MEAD DR***	***E 1/4 - 1/2 (0.297 mi.)***	***34***	***81***

EXECUTIVE SUMMARY

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 05/25/2010 has revealed that there are 3 CORRACTS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PIONEER AMERICAS, LLC DBA OLIN	*8000 LAKE MEAD PARKWAY*	*0 - 1/8 (0.000 mi.)*	*A1*	*7*
TRONOX LLC	*8000 W LAKE MEAD DR*	*0 - 1/8 (0.000 mi.)*	*A6*	*34*
MONTROSE CHEMICAL CORPORATION	*LAKE MEAD DR*	*E 1/4 - 1/2 (0.297 mi.)*	*34*	*81*

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

A review of the RCRA-TSDF list, as provided by EDR, and dated 02/17/2010 has revealed that there are 4 RCRA-TSDF sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PIONEER AMERICAS, LLC DBA OLIN	*8000 LAKE MEAD PARKWAY*	*0 - 1/8 (0.000 mi.)*	*A1*	*7*
TITANIUM METALS CORPORATION	*8000 E LAKE MEAD*	*0 - 1/8 (0.000 mi.)*	*A3*	*21*
TRONOX LLC	*8000 W LAKE MEAD DR*	*0 - 1/8 (0.000 mi.)*	*A6*	*34*
MONTROSE CHEMICAL CORPORATION	*LAKE MEAD DR*	*E 1/4 - 1/2 (0.297 mi.)*	*34*	*81*

Federal RCRA generators list

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 02/17/2010 has revealed that there is 1 RCRA-LQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TITANIUM METALS CORPORATION	*8000 E LAKE MEAD*	*0 - 1/8 (0.000 mi.)*	*A3*	*21*

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 02/17/2010 has revealed that there are 4 RCRA-SQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PIONEER AMERICAS, LLC DBA OLIN	***8000 LAKE MEAD PARKWAY***	***0 - 1/8 (0.000 mi.)***	***A1***	***7***
TRONOX LLC	***8000 W LAKE MEAD DR***	***0 - 1/8 (0.000 mi.)***	***A6***	***34***
FORMER STAUFFER CHEMICAL CO FA	***8000 LAKE MEAD PKWY GAT***	***0 - 1/8 (0.000 mi.)***	***A10***	***61***
TARGET CORPORATION STORE NO.24	350 W LAKE MEAD PKWY	S 0 - 1/8 (0.094 mi.)	B14	65

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 02/17/2010 has revealed that there are 3 RCRA-CESQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SAGUARO POWER COMPANY	***8000 WEST LAKE MEAD DRI***	***0 - 1/8 (0.000 mi.)***	***A9***	***49***
HAFENS OK TIRE STORE	***505 W LAKE MEAD DR***	***S 0 - 1/8 (0.121 mi.)***	***C19***	***68***

Lower Elevation	Address	Direction / Distance	Map ID	Page
AMERICAN SHOOTERS	1212 N BOULDER HIGHWAY	N 1/8 - 1/4 (0.245 mi.)	32	78

State- and tribal - equivalent CERCLIS

SHWS: Corrective Action Case list (Active, Non-ust Hazardous Waste and Regulated Substance. Correction Actions)

A review of the SHWS list, as provided by EDR, and dated 07/08/2010 has revealed that there are 33 SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
JACK B. KELLEY, INC. Date Closed: 05/12/1992	8000 WEST LAKE MEAD DRI	0 - 1/8 (0.000 mi.)	A8	48
SAGUARO POWER PLANT Date Closed: 10/18/1995	8000 WEST LAKE MEAD DRI	0 - 1/8 (0.000 mi.)	A13	65
D.A. HEIL-DEL AUGUST COMPANY Date Closed: 04/04/1997	631 WEST LAKE MEAD DRIV	S 1/8 - 1/4 (0.152 mi.)	D23	73
BURKHOLDER JUNIOR HIGH SCHOOL Date Closed: 10/16/1990	355 WEST VAN WAGENEN ST	S 1/4 - 1/2 (0.338 mi.)	38	94
SHELL STATION (FORMER)/JIM HAN Date Closed: 11/10/1999	65 WEST LAKE MEAD DRIVE	E 1/4 - 1/2 (0.352 mi.)	39	94

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TEXACO STATION #0675 Date Closed: 11/28/1995	3 EAST LAKE MEAD DRIVE	E 1/4 - 1/2 (0.445 mi.)	G42	96
VERNS TEXACO Date Closed: 08/03/2001	3 EAST LAKE MEAD DRIVE	E 1/4 - 1/2 (0.445 mi.)	G43	96
BURKHOLDER PARK Date Closed: 09/08/2000	645 WEST VICTORY ROAD	S 1/4 - 1/2 (0.470 mi.)	45	97
CHEMSTAR LIME COMPANY OF NEVAD Date Closed: 08/09/1993	BMI COMPLEX	S 1/4 - 1/2 (0.486 mi.)	H46	97
STAUFFER/PIONEER CHLOR-ALKALI Date Closed: 04/15/2009 Date Closed: 10/27/1999	BMI COMPLEX	S 1/4 - 1/2 (0.486 mi.)	H47	97
CHEMSTAR, INC. Date Closed: 01/31/1995	BMI COMPLEX	S 1/4 - 1/2 (0.486 mi.)	H48	98
MONTROSE CHEMICAL COMPANY	BMI COMPLEX	S 1/4 - 1/2 (0.486 mi.)	H49	98
ALLEYWAY Date Closed: 07/30/1998	38 WATER STREET	ESE 1/2 - 1 (0.594 mi.)	51	99
LAKE MEAD CHEVRON FOOD MART Date Closed: 03/26/2004	101 EAST LAKE MEAD DRIV	E 1/2 - 1 (0.653 mi.)	I53	100
ST. ROSE DOMINICAN HOSPITAL Date Closed: 01/05/1991	102 LAKE MEAD DRIVE	E 1/2 - 1 (0.662 mi.)	I54	100
CHEVRON #94668 Date Closed: 12/05/1991	100 NORTH BOULDER HIGHW	ENE 1/2 - 1 (0.678 mi.)	55	100
SPRINT CENTRAL TELEPHONE Date Closed: 02/11/1997	104 WATER STREET	ESE 1/2 - 1 (0.685 mi.)	56	101
7-ELEVEN #13696 - CLOSED Date Closed: 04/08/1997	***120 E LAKE MEAD DR***	***ENE 1/2 - 1 (0.802 mi.)***	***58***	***101***
UNOCAL SS #5747 Date Closed: 10/24/2001	100 SOUTH BOULDER HIGHW	E 1/2 - 1 (0.802 mi.)	59	102
CITY OF HENDERSON - POLICE DEP Date Closed: 09/12/1991	243 SOUTH WATER STREET	ESE 1/2 - 1 (0.885 mi.)	63	103
DEPT. OF PUBLIC WORKS/CITY OF Date Closed: 04/11/1996	214 SOUTH BOULDER HIGHW	E 1/2 - 1 (0.918 mi.)	64	104

Lower Elevation	Address	Direction / Distance	Map ID	Page
NEVADA PIC-A-PART , APN 178-12 Date Closed: 10/06/2009	110 WEST ROLLY STREET	N 1/4 - 1/2 (0.314 mi.)	F35	91
HENDERSON ELECTRIC MOTORS Date Closed: 07/30/1993	***1414 ATHOL ST***	***N 1/4 - 1/2 (0.328 mi.)***	***F37***	***92***
SOUTHERN OASIS CONSTRUCTION Date Closed: 01/11/1996	1548 ATHOL STREET	N 1/4 - 1/2 (0.433 mi.)	41	95
K-MART STORE #9554 Date Closed: 11/17/1992	498 BOULDER HIGHWAY	ENE 1/4 - 1/2 (0.487 mi.)	50	99
CREDIT AUTO SALES Date Closed: 09/27/1991	1700 NORTH BOULDER HIGH	N 1/2 - 1 (0.650 mi.)	52	99
EDGAR MILLOWAY PROPERTY Date Closed: 02/05/1998	308 WEST FOSTER	NNW 1/2 - 1 (0.800 mi.)	J57	101

Lower Elevation	Address	Direction / Distance	Map ID	Page
C & P ENTERPRISES Date Closed: 09/09/1992	321 FOSTER AVENUE	NNW 1/2 - 1 (0.805 mi.)	J60	102
MONIER LIFE TILE Date Closed: 08/05/1998	430 EASTGATE ROAD	WNW 1/2 - 1 (0.831 mi.)	61	103
BONANZA MATERIALS Date Closed: 08/29/1991	450 EASTGATE ROAD	WNW 1/2 - 1 (0.865 mi.)	62	103
BASIC READY MIX Date Closed: 06/25/1993	513 EASTGATE ROAD	NW 1/2 - 1 (0.934 mi.)	K65	104
RAYMOND LAND, LLC , APN 178-02 Date Closed: 04/22/2009 Date Closed: 09/21/2000	513 EASTGATE ROAD	NW 1/2 - 1 (0.938 mi.)	K66	104
INDEPENDENT LANDSCAPE SERVICES Date Closed: 07/13/2007	647 CAPE HORN DRIVE	NW 1/2 - 1 (0.960 mi.)	67	105

State and tribal leaking storage tank lists

LUST: Leaking UST List.

A review of the LUST list, as provided by EDR, and dated 07/08/2010 has revealed that there are 3 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HENDERSON SERVICE CENTER	***680 LAKE MEAD DR***	***SSW 1/8 - 1/4 (0.161 mi.)***	***25***	***74***
CIRCLE K CORPORATION #1366 Date Closed: 04/20/2007	450 NORTH WATER STREET	ENE 1/4 - 1/2 (0.451 mi.)	44	96

Lower Elevation	Address	Direction / Distance	Map ID	Page
CIRCLE K STORE NO. 1309 , APN Date Closed: 04/03/2007	1324 NORTH BOULDER HIGH	N 1/4 - 1/2 (0.315 mi.)	36	91

State and tribal registered storage tank lists

UST: Registered Underground Storage Tank Facilities.

A review of the UST list, as provided by EDR, and dated 07/08/2010 has revealed that there are 14 UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PIONEER AMERICAS, LLC DBA OLIN	***8000 LAKE MEAD PARKWAY***	***0 - 1/8 (0.000 mi.)***	***A1***	***7***
JACK B KELLEY INC	8000 WEST LAKE MEAD DRI	0 - 1/8 (0.000 mi.)	A2	20
STAUFFER CHEMICAL COMPANY	8000 LAKE MEAD DRIVE	0 - 1/8 (0.000 mi.)	A4	32
TIMET	8000 W LAKE MEAD DRIVE	0 - 1/8 (0.000 mi.)	A5	33
SAME AS 8000693	8000 WEST LAKE MEAD DRI	0 - 1/8 (0.000 mi.)	A7	48
W.S. HATCH CO.	8000 W LAKE MEAD BLVD	0 - 1/8 (0.000 mi.)	A11	63
LAKE MEAD AUTO MARINE	433 WEST LAKE MEAD DRIV	S 0 - 1/8 (0.115 mi.)	B17	68
REBEL OIL #68	601 W. LAKE MEAD DR	S 1/8 - 1/4 (0.144 mi.)	20	70

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
VACANT PARCEL	631 W LAKE MEAD DR	S 1/8 - 1/4 (0.152 mi.)	D22	72
SAME AS 8000693	LAKE MEAD & ATLANTIC AV	ESE 1/8 - 1/4 (0.161 mi.)	24	73
HENDERSON SERVICE CENTER	***680 LAKE MEAD DR***	***SSW 1/8 - 1/4 (0.161 mi.)***	***25***	***74***
JONES CHEMICALS INC	LAKE MEAD DR	ENE 1/8 - 1/4 (0.169 mi.)	26	75
CENTRAL TELEPHONE COMPANY	681 W LAKE MEAD BLVD HN	S 1/8 - 1/4 (0.208 mi.)	30	76
CHEMSTAR - BMI COMPLEX	E ST. BETWEEN PIONEER C	SSW 1/8 - 1/4 (0.250 mi.)	33	80

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: A listing of recycling facilities in Nevada.

A review of the SWRCY list, as provided by EDR, and dated 03/04/2010 has revealed that there are 2 SWRCY sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PHILLIPS SERVICES	8390 SO. 4TH STREET, SU	WSW 1/8 - 1/4 (0.181 mi.)	28	76

Lower Elevation	Address	Direction / Distance	Map ID	Page
IND	400 MAX CT.	N 1/4 - 1/2 (0.383 mi.)	40	95

Other Ascertainable Records

RCRA-NonGen: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA-NonGen list, as provided by EDR, and dated 02/17/2010 has revealed that there are 2 RCRA-NonGen sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
JONES CHEMICALS INC	***8000 W LAKE MEAD DR SIT***	***0 - 1/8 (0.000 mi.)***	***A12***	***63***
MOCKETT ENTERPRISES	***121 INDUSTRIAL PARK RD***	***S 1/8 - 1/4 (0.226 mi.)***	***31***	***77***

FUDS: The Listing includes locations of Formerly Used Defense Sites Properties where the US Army Corps Of Engineers is actively working or will take necessary cleanup actions.

A review of the FUDS list, as provided by EDR, and dated 12/31/2009 has revealed that there is 1 FUDS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PLANCOR 201-C		ENE 1/8 - 1/4 (0.152 mi.)	21	72

EXECUTIVE SUMMARY

EDR PROPRIETARY RECORDS

EDR Proprietary Records

EDR Historical Auto Stations: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc.

A review of the EDR Historical Auto Stations list, as provided by EDR, has revealed that there are 5 EDR Historical Auto Stations sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
JIM S UNION	401 W LAKE MEAD DR	S 0 - 1/8 (0.111 mi.)	B15	67
BASIC MTR SERV	433 W LAKE MEAD DR	S 0 - 1/8 (0.114 mi.)	B16	67
OK TIRE STORES	505 LAKE MEAD DR	S 0 - 1/8 (0.120 mi.)	C18	68

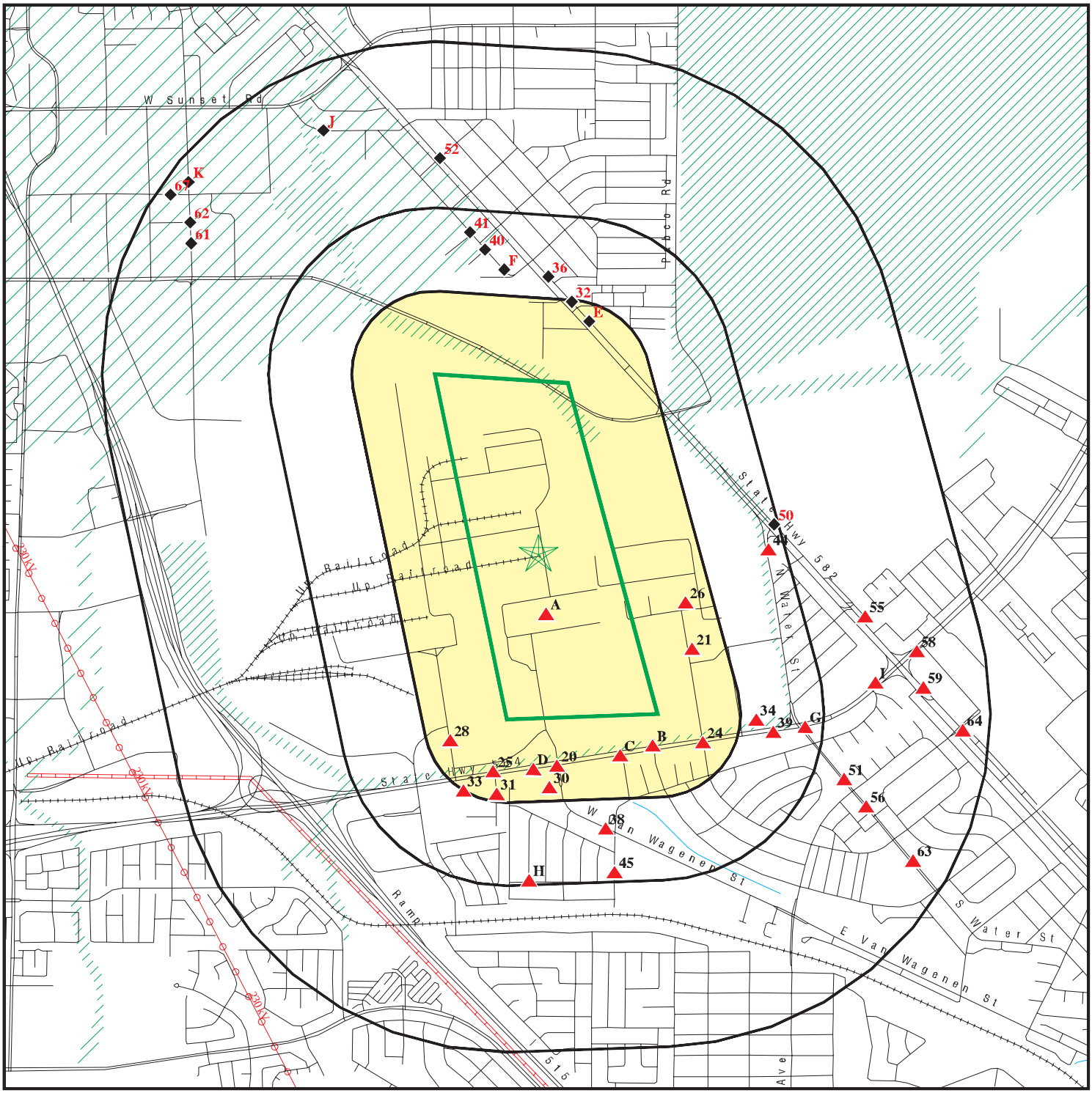
Lower Elevation	Address	Direction / Distance	Map ID	Page
TRI CITY MTRS	1135 N BOULDER	NNE 1/8 - 1/4 (0.178 mi.)	E27	75
BLVD S NO 3	1136 N BOULDER HWY	NNE 1/8 - 1/4 (0.196 mi.)	E29	76

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
WESTERN AREA POWER ADMINISTRATION	HWS
WARM SPRINGS BUSINESS PARK (PROPOS	HWS
THE WINROC CORPORATION MOBILE SOUR	HWS
ATLAS, INC.	HWS
BOULDER HIGHWAY DIESEL SPILL	HWS
NEVADA DEPARTMENT OF TRANSPORTATIO	HWS
LEVY REALTY TRUST , FIESTA PROPERT	HWS
INFRASOURCE POWER MOBILE SOURCE ,	HWS
AMERICAN ASPHALT & GRADING COMPANY	HWS
U.S. BUREAU OF RECLAMATION	HWS
BLM LAKE LAS VEGAS	HWS
SKY HARBOR AIRPORT	HWS
SILVER STATE DISPOSAL	HWS
U.S. XPRESS ENTERPRISES MOBILE SOU	HWS
BONANZA MATERIALS	HWS
HENDERSON LEAD CONTAMINATION SOIL	CERCLIS,FINDS
FIESTA PARK HOME DEVELOPMENT SITE	RCRA-NLR
EBONY CONSTRUCTION	FINDS,RCRA-NLR
USDOE WAPA AMARGOSA SUBSTATION	FINDS,RCRA-CESQG
TRONOX LLC - HENDERSON, NV	TSCA

OVERVIEW MAP - 02938729.2r



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

Power transmission lines

Oil & Gas pipelines

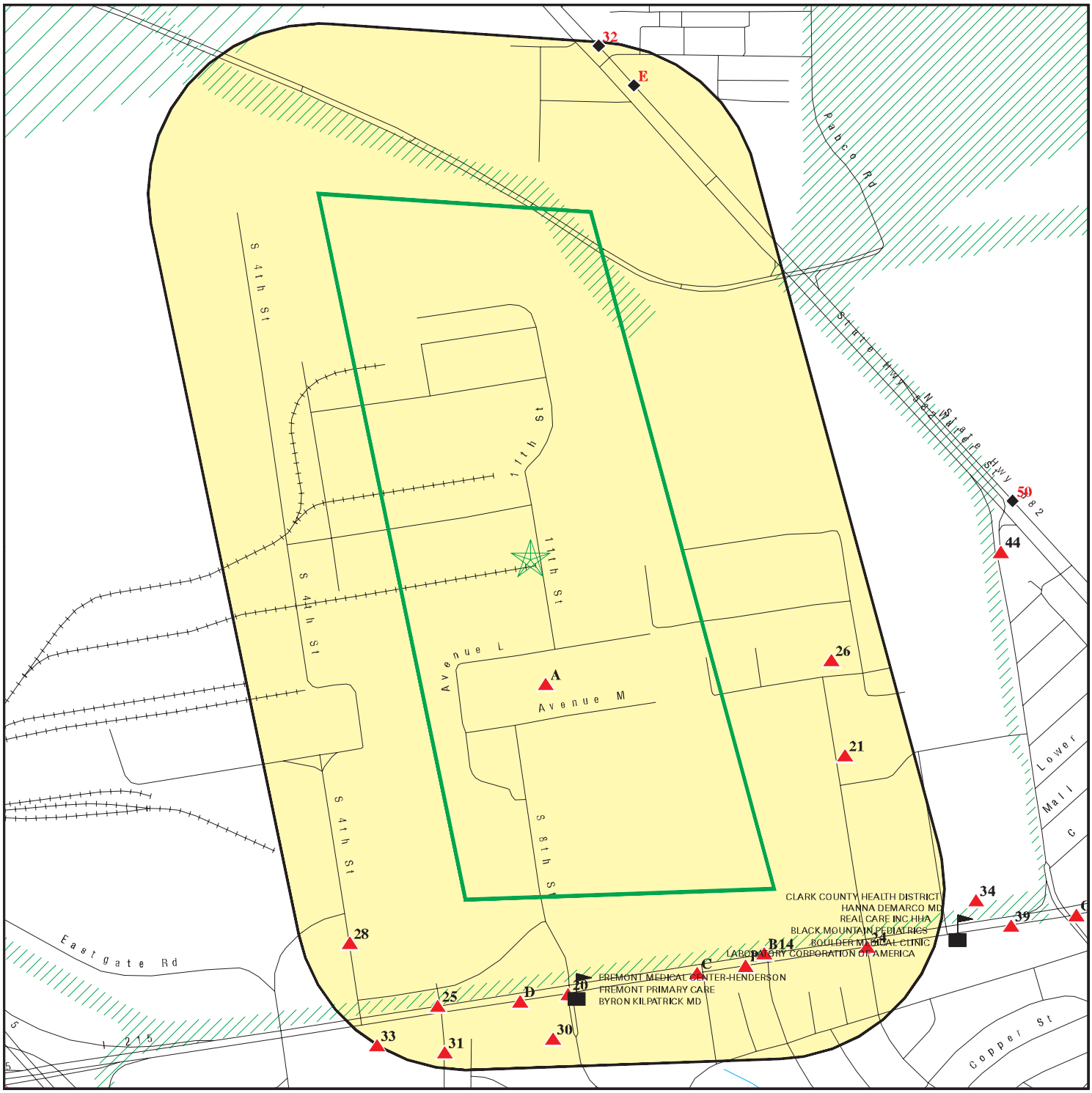
100-year flood zone

500-year flood zone

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Tronox	CLIENT:	Environ Corporation
ADDRESS:	560 W Lake Mead Parkway Henderson NV 89015	CONTACT:	Wendy Seider
		INQUIRY #:	02938729.2r
LAT/LONG:	36.0445 / 115.0013	DATE:	December 07, 2010 9:27 am

DETAIL MAP - 02938729.2r



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Tronox	CLIENT: Environ Corporation
ADDRESS: 560 W Lake Mead Parkway Henderson NV 89015	CONTACT: Wendy Seider INQUIRY #: 02938729.2r
LAT/LONG: 36.0445 / 115.0013	DATE: December 07, 2010 9:28 am

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
NPL LIENS		TP	NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.000	0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS		0.500	1	0	0	NR	NR	1
FEDERAL FACILITY		1.000	0	0	0	0	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		0.500	2	0	1	NR	NR	3
Federal RCRA CORRACTS facilities list								
CORRACTS		1.000	2	0	1	0	NR	3
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		0.500	3	0	1	NR	NR	4
Federal RCRA generators list								
RCRA-LQG		0.250	1	0	NR	NR	NR	1
RCRA-SQG		0.250	4	0	NR	NR	NR	4
RCRA-CESQG		0.250	2	1	NR	NR	NR	3
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		0.500	0	0	0	NR	NR	0
US INST CONTROL		0.500	0	0	0	NR	NR	0
Federal ERNS list								
ERNS		TP	NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS		1.000	2	1	13	17	NR	33
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		0.500	0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST		0.500	0	1	2	NR	NR	3
INDIAN LUST		0.500	0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST		0.250	7	7	NR	NR	NR	14

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
AST		0.250	0	0	NR	NR	NR	0
INDIAN UST		0.250	0	0	NR	NR	NR	0
FEMA UST		0.250	0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP		0.500	0	0	0	NR	NR	0
INDIAN VCP		0.500	0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		0.500	0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		0.500	0	0	0	NR	NR	0
ODI		0.500	0	0	0	NR	NR	0
SWRCY		0.500	0	1	1	NR	NR	2
INDIAN ODI		0.500	0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		TP	NR	NR	NR	NR	NR	0
US HIST CDL		TP	NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2		TP	NR	NR	NR	NR	NR	0
LUCIS		0.500	0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS		TP	NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.250	1	1	NR	NR	NR	2
DOT OPS		TP	NR	NR	NR	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
FUDS		1.000	0	1	0	0	NR	1
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
UMTRA		0.500	0	0	0	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
HIST FTTS		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
ICIS		TP	NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
PADS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
RADINFO		TP	NR	NR	NR	NR	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
NPDES		TP	NR	NR	NR	NR	NR	0
AIRS		TP	NR	NR	NR	NR	NR	0
HMRI		TP	NR	NR	NR	NR	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
SCRD DRYCLEANERS		0.500	0	0	0	NR	NR	0
COAL ASH EPA		0.500	0	0	0	NR	NR	0
COAL ASH DOE		TP	NR	NR	NR	NR	NR	0
PCB TRANSFORMER		TP	NR	NR	NR	NR	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.000	0	0	0	0	NR	0
EDR Historical Auto Stations		0.250	3	2	NR	NR	NR	5
EDR Historical Cleaners		0.250	0	0	NR	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1
< 1/8
1 ft.

Relative:
Higher

Actual:
1814 ft.

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
8000 LAKE MEAD PARKWAY
HENDERSON, NV 89015

Site 1 of 13 in cluster A

RCRA-TSDF 1000312425
CERCLIS NVD062081500
CORRACTS
RCRA-SQG
SSTS
PADS
FINDS
UST

RCRA-TSDF:

Date form received by agency:	09/23/2009
Facility name:	PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name:	PIONEER AMERICAS, LLC DBA OLIN CHLOR ALKALI PRODUCTS
Facility address:	8000 LAKE MEAD PKWY HENDERSON, NV 89015
EPA ID:	NVD062081500
Mailing address:	P O BOX 86 HENDERSON, NV 89009 7001
Contact:	CINDI BYRNS
Contact address:	P O BOX 86 HENDERSON, NV 89009 7001
Contact country:	US
Contact telephone:	(702) 564-0248
Contact email:	CBYRNS@OLIN.COM
EPA Region:	09
Land type:	Private
Classification:	TSDF
Description:	Handler is engaged in the treatment, storage or disposal of hazardous waste
TSD commencement date:	Not reported

Owner/Operator Summary:

Owner/operator name:	PIONEER AMERICAS, LLC DBA OLIN CHLOR-ALK
Owner/operator address:	LAKE MEAD PARKWAY P.O. BOX 96 HENDERSON, NV 89009
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	08/31/2007
Owner/Op end date:	Not reported

Owner/operator name:	PIONEER AMERICAS, LLC DBA OLIN CHLOR-ALK
Owner/operator address:	LAKE MEAD PARKWAY P.O. BOX 96 HENDERSON, NV 89009
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	08/31/2007
Owner/Op end date:	Not reported

Owner/operator name:	PIONEER AMERICAS LLC / OLIN CHLOR AKLALI
Owner/operator address:	P O BOX 86 HENDERSON, NV 89009
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Owner/Op start date: 08/31/2007
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Lamps
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Pesticides
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Thermostats
Accumulated waste on-site: No
Generated waste on-site: Not reported

Historical Generators:
Date form received by agency: 02/25/2008
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALKALI PRODUCTS
Classification: Large Quantity Generator

Date form received by agency: 02/15/2008
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER AMERICAS L L C DBA OLIN CHLOR ALKALI PRODUCTS
Classification: Small Quantity Generator

Date form received by agency: 02/27/2006
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER AMERICAS L L C
Classification: Large Quantity Generator

Date form received by agency: 02/22/2006
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Site name: PIONEER AMERICAS LLC
Classification: Large Quantity Generator

Date form received by agency: 01/02/2002
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER AMERICAS L L C
Classification: Small Quantity Generator

Date form received by agency: 03/14/2001
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER
Classification: Large Quantity Generator

Date form received by agency: 05/25/1999
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER AMERICAS L L C
Classification: Small Quantity Generator

Date form received by agency: 09/23/1998
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER CHLOR ALKALI CO INC
Classification: Large Quantity Generator

Date form received by agency: 02/28/1994
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER CHLOR ALKALI CO INC
Classification: Large Quantity Generator

Date form received by agency: 02/28/1992
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER CHLOR ALKALI CO. INC.
Classification: Large Quantity Generator

Date form received by agency: 05/23/1991
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER AMERICAS L L C
Classification: Large Quantity Generator

Date form received by agency: 03/28/1990
Facility name: PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK
Site name: PIONEER CHLOR ALKALI CO., INC.
Classification: Large Quantity Generator

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Waste code: D008
Waste name: LEAD

Waste code: D039
Waste name: TETRACHLOROETHYLENE

Biennial Reports:

Last Biennial Reporting Year: 2009

Annual Waste Handled:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.
Amount (Lbs): 575

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.
Amount (Lbs): 16565

Waste code: D039
Waste name: TETRACHLOROETHYLENE
Amount (Lbs): 920

Corrective Action Summary:
Event date: 04/25/1991
Event: CA Responsibility Referred To A Non-RCRA Federal Authority, Corrective Action referred to another non-RCRA Federal Authority.

Event date: 03/22/1993
Event: RFA Completed, Assessment was an RFA.

Event date: 01/06/1998
Event: CA074ME

Event date: 01/06/1998
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Facility Has Received Notices of Violations:

Regulation violated: Not reported
Area of violation: Used Oil - Generators
Date violation determined: 10/10/2006
Date achieved compliance: 12/15/2006
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/01/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - Pre-transport
Date violation determined: 10/10/2006
Date achieved compliance: 12/15/2006
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/01/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Container Use and Management
Date violation determined: 10/10/2006
Date achieved compliance: 12/15/2006
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/01/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 01/27/1994
Date achieved compliance: 03/17/1994
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Regulation violated: SR - 262.50-60
Area of violation: Generators - General
Date violation determined: 01/27/1994
Date achieved compliance: 03/17/1994
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 01/28/1985
Date achieved compliance: 05/09/1985
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 10/03/1984
Date achieved compliance: 11/30/1987
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 10/03/1984
Date achieved compliance: 11/30/1987
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.140-150.H

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Area of violation: TSD - Financial Requirements
Date violation determined: 10/03/1984
Date achieved compliance: 11/30/1987
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/22/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/22/2008
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/09/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/10/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Container Use and Management
Date achieved compliance: 12/15/2006
Evaluation lead agency: State

Evaluation date: 10/10/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 12/15/2006
Evaluation lead agency: State

Evaluation date: 10/10/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 12/15/2006
Evaluation lead agency: State

Evaluation date: 08/20/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 12/16/1993

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 03/17/1994
Evaluation lead agency: State

Evaluation date: 08/06/1993
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/30/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/23/1987
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/16/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/11/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/12/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/04/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/29/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 03/14/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Evaluation lead agency: State

Evaluation date: 01/28/1985
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - General
Date achieved compliance: 05/09/1985
Evaluation lead agency: State

Evaluation date: 10/03/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - General
Date achieved compliance: 11/30/1987
Evaluation lead agency: State

Evaluation date: 10/03/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - Closure/Post-Closure
Date achieved compliance: 11/30/1987
Evaluation lead agency: State

Evaluation date: 10/03/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 11/30/1987
Evaluation lead agency: State

CERCLIS:
Site ID: 0902949
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: Deferred to RCRA

CERCLIS Site Contact Name(s):
Contact Name: Carl Brickner
Contact Tel: (415) 972-3814
Contact Title: Site Assessment Manager (SAM)

Site Description: Not reported

CERCLIS Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 09/01/79
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 11/01/79
Priority Level: Low priority for further assessment

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 05/01/85
Priority Level: Higher priority for further assessment

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 03/16/90

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Priority Level: Deferred to RCRA (Subtitle C)

CORRACTS:

EPA ID: NVD062081500
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/6/1998
Action: CA074ME
NAICS Code(s): 325181
Alkalies and Chlorine Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD062081500
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/6/1998
Action: CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s): 325181
Alkalies and Chlorine Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD062081500
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 3/22/1993
Action: CA050RF - RFA Completed, Assessment was an RFA
NAICS Code(s): 325181
Alkalies and Chlorine Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD062081500
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 4/25/1991
Action: CA210T - CA Responsibility Referred To A Non-RCRA Federal Authority, Corrective Action referred to another non-RCRA Federal Authority
NAICS Code(s): 325181
Alkalies and Chlorine Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

SSTS:
Product: CHLORINE
Contact: Not reported
Status: Active
Registration Number: 061667NV 001
Report Year: 1996
Permit: Registered
Product Number: 06166700001
Product Type: Technical material or active ingredient

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Product Class: Antifouling Paint
Product Use: Not reported
UOM: T
Market: Marketed in the United States
Region: Not reported
Zero product: Not reported
Pesticide RUP report: Not reported

Product: SODIUM HYPOCHLORITE (BLEACH)
Contact: Not reported
Status: Active
Registration Number: 061667NV 001
Report Year: 1996
Permit: Registered
Product Number: 06166720001
Product Type: Technical material or active ingredient
Product Class: Antifouling Paint
Product Use: Not reported
UOM: T
Market: Marketed in the United States
Region: Not reported
Zero product: Not reported
Pesticide RUP report: Not reported

Product: CHLORINE
Contact: Not reported
Status: Active
Registration Number: 061667NV 001
Report Year: 1997
Permit: Registered
Product Number: 06166700001
Product Type: Technical material or active ingredient
Product Class: Antifouling Paint
Product Use: Not reported
UOM: T
Market: Marketed in the United States
Region: Not reported
Zero product: Not reported
Pesticide RUP report: Not reported

Product: SODIUM HYPOCHLORITE (BLEACH)
Contact: Not reported
Status: Active
Registration Number: 061667NV 001
Report Year: 1997
Permit: Registered
Product Number: 06166720001
Product Type: Technical material or active ingredient
Product Class: Antifouling Paint
Product Use: Not reported
UOM: T
Market: Marketed in the United States
Region: Not reported
Zero product: Not reported
Pesticide RUP report: Not reported

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

PADS:

EPAID:	NVD062081500
Facility name:	PIONEER CHLOR ALKALI CO INC
Facility Address:	8000 LAKE MEAD DR HENDERSON, NV 89015
Facility country:	US
Generator:	Yes
Storer:	No
Transporter:	No
Disposer:	No
Research facility:	No
Smelter:	No
Facility owner name:	PIONEER CHLOR ALKALI CO INC
Contact title:	Not reported
Contact name:	SCHOEN STEPHEN M
Contact tel:	(702)565-8781
Contact extension:	Not reported
Mailing address:	PO BOX 86 HENDERSON, NV 89015
Mailing country:	US
Cert. title:	Not reported
Cert. name:	Not reported
Cert. date:	5/24/1990
Date received:	6/13/1990

FINDS:

Registry ID: 110000577322

Environmental Interest/Information System

Nevada Facility Profile (NV-FP) system contains facility based, integrated environmental information for the State of Nevada.

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

US EPA TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

PCS (Permit Compliance System) is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

US EPA Risk Management Plan (RMP) database stores the risk management plans reported by companies that handle, manufacture, use, or store certain flammable or toxic substances, as required under section 112(r) of the Clean Air Act (CAA).

SSTS (Section Seven Tracking System) evolved from the FIFRA and TSCA Enforcement System (FATES). SSTS tracks the registration of all pesticide-producing establishments and tracks annually the types and amounts of pesticides, active ingredients, and related devices that are produced, sold, or distributed each year.

UST:
Facility ID: 8-001525

Owner:
Owner: PIONEER CHLOR ALKALI COMPANY
Owner Address: PO BOX 86
Owner City,St,Zip: HENDERSON, NV 89009
Owner Phone: (702) 565-8781
Owner Desc: Commercial

Federally Regulated Tank: FALSE
Tank ID: 1
Tank Status: Currently in Use
Tank Capacity: 500
Tank Substance: Diesel
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Not Listed

PIONEER AMERICAS, LLC DBA OLIN CHLOR ALK (Continued) **1000312425**

Pipe:	None
Install Date:	1/1/1970
Federally Regulated Tank:	FALSE
Tank ID:	2
Tank Status:	Currently in Use
Tank Capacity:	500
Tank Substance:	Diesel
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Not Listed
Pipe:	None
Install Date:	1/1/1978
Federally Regulated Tank:	FALSE
Tank ID:	3
Tank Status:	Currently in Use
Tank Capacity:	500
Tank Substance:	Diesel
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Not Listed
Pipe:	None
Install Date:	1/1/1978
Federally Regulated Tank:	FALSE
Tank ID:	4
Tank Status:	Currently in Use
Tank Capacity:	10000
Tank Substance:	Diesel
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Not Listed
Pipe:	None
Install Date:	1/1/1970
Federally Regulated Tank:	FALSE
Tank ID:	5
Tank Status:	Currently in Use
Tank Capacity:	1200
Tank Substance:	Gasoline
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Not Listed
Pipe:	None
Install Date:	1/1/1970

A2 **JACK B KELLEY INC** **UST** **U003380591**
8000 WEST LAKE MEAD DRIVE **N/A**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 2 of 13 in cluster A

Relative: Higher

Actual: 1814 ft.

UST:

Facility ID:	8-001374

Owner:

Owner:	JACK B KELLEY INC

JACK B KELLEY INC (Continued) **U003380591**

Owner Address:	8000 WEST LAKE MEAD DRIVE
Owner City,St,Zip:	HENDERSON, NV 89015
Owner Phone:	( ) -
Owner Desc:	Private
Federally Regulated Tank:	TRUE
Tank ID:	1
Tank Status:	Permanently Out of Use
Tank Capacity:	600
Tank Substance:	Used Oil
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Other
Pipe:	None
Install Date:	6/1/1971

A3 **TITANIUM METALS CORPORATION** **RCRA-TSDF** **1000152656**
8000 E LAKE MEAD **CERC-NFRAP** **89015TTNMMPO**
< 1/8 **HENDERSON, NV 89015** **RCRA-LQG**
1 ft. **TRIS**
Site 3 of 13 in cluster A **FINDS**
RAATS

Relative:
Higher

RCRA-TSDF:

Date form received by agency:	02/22/2008
Facility name:	TITANIUM METALS CORPORATION
Facility address:	181 NORTH WATER STREET, BLACK TAIN INDUSTRIAL PARK GATE 3 HENDERSON, NV 89015
EPA ID:	NVD009562471
Mailing address:	P.O.BOX 2128 HENDERSON, NV 89015
Contact:	RANDY B ROBERTS
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	(702) 566-4422
Contact email:	RANDY.ROBERTS@TIMET.COM
EPA Region:	09
Land type:	Private
Classification:	TSDF
Description:	Handler is engaged in the treatment, storage or disposal of hazardous waste
TSD commencement date:	Not reported
Classification:	Large Quantity Generator
Description:	Handler: generates 1,000 kg or more of hazardous waste during any calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Actual:
1814 ft.

TITANIUM METALS CORPORATION (Continued) **1000152656**

Owner/Operator Summary:
Owner/operator name: TITANIUM METALS CORPORATION
Owner/operator address: NORTH WATER STREET, BLACK MOUN TAIN INDUSTRIAL PARK GATE 3
HENDERSON, NV 89015
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 06/28/1952
Owner/Op end date: Not reported

Owner/operator name: TITANIUM METALS CORPORATION
Owner/operator address: NORTH WATER STREET, BLACK MOUN TAIN INDUSTRIAL PARK GATE 3
HENDERSON, NV 89015
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 06/28/1952
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: Yes
Generated waste on-site: Not reported

Waste type: Lamps
Accumulated waste on-site: Yes
Generated waste on-site: Not reported

Waste type: Pesticides
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Thermostats
Accumulated waste on-site: No
Generated waste on-site: Not reported

TITANIUM METALS CORPORATION (Continued) **1000152656**

Historical Generators:
Date form received by agency: 06/26/2002
Facility name: TITANIUM METALS CORPORATION
Site name: TITANIUM METALS CORP OF AMER TIMET
Classification: Small Quantity Generator

Date form received by agency: 03/14/2001
Facility name: TITANIUM METALS CORPORATION
Classification: Large Quantity Generator

Date form received by agency: 01/22/1993
Facility name: TITANIUM METALS CORPORATION
Site name: TITANIUM METALS CORP OF AMER TIMET
Classification: Large Quantity Generator

Date form received by agency: 02/20/1992
Facility name: TITANIUM METALS CORPORATION
Classification: Large Quantity Generator

Date form received by agency: 02/20/1992
Facility name: TITANIUM METALS CORPORATION
Site name: TITANIUM METALS CORP OF AMER TIMET
Classification: Small Quantity Generator

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Waste code: D003
Waste name: A MATERIAL IS CONSIDERED TO BE A REACTIVE HAZARDOUS WASTE IF IT IS NORMALLY UNSTABLE, REACTS VIOLENTLY WITH WATER, GENERATES TOXIC GASES WHEN EXPOSED TO WATER OR CORROSIVE MATERIALS, OR IF IT IS CAPABLE OF DETONATION OR EXPLOSION WHEN EXPOSED TO HEAT OR A FLAME. ONE EXAMPLE OF SUCH WASTE WOULD BY WASTE GUNPOWDER.

Waste code: D008
Waste name: LEAD

Waste code: D009
Waste name: MERCURY

TITANIUM METALS CORPORATION (Continued) **1000152656**

Waste code: D011
Waste name: SILVER

Waste code: U022
Waste name: BENZO[A]PYRENE

Waste code: U050
Waste name: CHRYSENE

Waste code: U063
Waste name: DIBENZ[A,H]ANTHRACENE

Waste code: U064
Waste name: BENZO[RST]PENTAPHENE

Waste code: U126
Waste name: GLYCIDYLALDEHYDE

Waste code: U137
Waste name: INDENO[1,2,3-CD]PYRENE

Waste code: U210
Waste name: ETHENE, TETRACHLORO-

Waste code: U228
Waste name: ETHENE, TRICHLORO-

Biennial Reports:

Last Biennial Reporting Year: 2009

Annual Waste Handled:

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.
Amount (Lbs): 869.9

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.
Amount (Lbs): 46117.9

Waste code: D003
Waste name: A MATERIAL IS CONSIDERED TO BE A REACTIVE HAZARDOUS WASTE IF IT IS NORMALLY UNSTABLE, REACTS VIOLENTLY WITH WATER, GENERATES TOXIC GASES WHEN EXPOSED TO WATER OR CORROSIVE MATERIALS, OR IF IT IS CAPABLE OF DETONATION OR EXPLOSION WHEN EXPOSED TO HEAT OR A FLAME. ONE EXAMPLE OF SUCH WASTE WOULD BY WASTE GUNPOWDER.

TITANIUM METALS CORPORATION (Continued) **1000152656**

Amount (Lbs): 26438

Waste code: D008
Waste name: LEAD
Amount (Lbs): 17757

Waste code: D009
Waste name: MERCURY
Amount (Lbs): 450

Waste code: D011
Waste name: SILVER
Amount (Lbs): 2750

Waste code: U022
Waste name: BENZO[A]PYRENE
Amount (Lbs): 304

Waste code: U050
Waste name: CHRYSENE
Amount (Lbs): 304

Waste code: U063
Waste name: DIBENZ[A,H]ANTHRACENE
Amount (Lbs): 304

Waste code: U064
Waste name: BENZO[RST]PENTAPHENE
Amount (Lbs): 304

Waste code: U126
Waste name: GLYCIDYLALDEHYDE
Amount (Lbs): 304

Waste code: U137
Waste name: INDENO[1,2,3-CD]PYRENE
Amount (Lbs): 304

Waste code: U210
Waste name: ETHENE, TETRACHLORO-
Amount (Lbs): 367

Waste code: U228
Waste name: ETHENE, TRICHLORO-
Amount (Lbs): 367

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - Pre-transport
Date violation determined: 10/24/2007
Date achieved compliance: 02/14/2008
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/15/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported

TITANIUM METALS CORPORATION (Continued) **1000152656**

Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: State Statute or Regulation
Date violation determined: 10/24/2007
Date achieved compliance: 02/14/2008
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/15/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Container Use and Management
Date violation determined: 10/24/2007
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/15/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 04/02/2004
Date achieved compliance: 10/14/2005
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 02/07/2005
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Collection Centers AND Point
Date violation determined: 04/02/2004
Date achieved compliance: 09/14/2005
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 02/07/2005
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA

TITANIUM METALS CORPORATION (Continued) **1000152656**

Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Universal Waste - Large Quantity Handlers
Date violation determined: 04/02/2004
Date achieved compliance: 09/14/2005
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 02/07/2005
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 04/06/1999
Date achieved compliance: 06/25/1999
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 279.20-24
Area of violation: Used Oil - Generators
Date violation determined: 04/06/1999
Date achieved compliance: 06/25/1999
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 279.10-12
Area of violation: Used Oil - Generators
Date violation determined: 04/06/1999
Date achieved compliance: 06/25/1999
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported

TITANIUM METALS CORPORATION (Continued) **1000152656**

Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 261.5
Area of violation: Generators - General
Date violation determined: 10/19/1995
Date achieved compliance: 10/25/1995
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 01/27/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/24/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 02/14/2008
Evaluation lead agency: State

Evaluation date: 10/24/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Container Use and Management
Date achieved compliance: 10/24/2007
Evaluation lead agency: State

Evaluation date: 10/24/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: State Statute or Regulation
Date achieved compliance: 02/14/2008
Evaluation lead agency: State

Evaluation date: 09/14/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 04/02/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Universal Waste - Large Quantity Handlers
Date achieved compliance: 09/14/2005
Evaluation lead agency: EPA

Evaluation date: 04/02/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General

TITANIUM METALS CORPORATION (Continued) **1000152656**

Date achieved compliance: 10/14/2005
Evaluation lead agency: EPA

Evaluation date: 04/02/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Collection Centers AND Point
Date achieved compliance: 09/14/2005
Evaluation lead agency: EPA

Evaluation date: 06/26/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/06/1999
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 06/25/1999
Evaluation lead agency: State

Evaluation date: 04/06/1999
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 06/25/1999
Evaluation lead agency: State

Evaluation date: 08/09/1996
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/19/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 10/25/1995
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 08/09/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/29/1984
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

CERC-NFRAP:
Site ID: 0902938
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: Addressed as Part of Another non-NPL Site

TITANIUM METALS CORPORATION (Continued) **1000152656**

CERCLIS-NFRAP Site Contact Name(s):
Contact Title: Not reported
Contact Name: Hon Cheung
Contact Tel: (415) 972-3209

Contact Title: Not reported
Contact Name: Debbie Schechter
Contact Tel: (415) 972-3093

Contact Title: Not reported
Contact Name: Carol Weinstein
Contact Tel: (415) 972-3083

CERCLIS-NFRAP Site Alias Name(s):
Alias Name: TIMET DIV HENDERSON PLT
Alias Address: Not reported
NV

Alias Name: TIMET
Alias Address: Not reported
NV

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 09/01/1979
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 11/01/1979
Priority Level: Low priority for further assessment

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 09/01/1986
Priority Level: Higher priority for further assessment

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 03/16/1990
Priority Level: Deferred to RCRA (Subtitle C)

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 11/20/1991
Priority Level: Not reported

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 11/20/1991
Priority Level: NFRAP: No further Remedial Action planned

FINDS:

TITANIUM METALS CORPORATION (Continued) **1000152656**

Registry ID: 110000600948

Environmental Interest/Information System

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

US EPA TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

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RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA’s programs. The vision for ICIS is to replace EPA’s independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also

TITANIUM METALS CORPORATION (Continued) **1000152656**

has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

PCS (Permit Compliance System) is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

US EPA Risk Management Plan (RMP) database stores the risk management plans reported by companies that handle, manufacture, use, or store certain flammable or toxic substances, as required under section 112(r) of the Clean Air Act (CAA).

A4 **STAUFFER CHEMICAL COMPANY** **UST** **U003380083**
8000 LAKE MEAD DRIVE **N/A**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 4 of 13 in cluster A

Relative: Higher

Actual: 1814 ft.

UST:
Facility ID: 8-000642

Owner:
Owner: STAUFFER CHEMICAL COMPANY
Owner Address: 8000 LAKE MEAD DRIVE
Owner City,St,Zip: HENDERSON, NV 89015
Owner Phone: (702) 565-8781
Owner Desc: Private

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Permanently Out of Use
Tank Capacity: 40000
Tank Substance: Hazardous Substance
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Bare Steel
Pipe: None
Install Date: 5/7/1965

Federally Regulated Tank: TRUE
Tank ID: 2
Tank Status: Permanently Out of Use
Tank Capacity: 40000
Tank Substance: Hazardous Substance
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Bare Steel
Pipe: None
Install Date: 5/7/1965

A5 **TIMET** **UST** **U003380128**
8000 W LAKE MEAD DRIVE **N/A**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 5 of 13 in cluster A

Relative:
Higher

Actual:
1814 ft.

UST:
Facility ID: 8-000693

Owner:
Owner: TIMET
Owner Address: PO BOX 2128
Owner City,St,Zip: HENDERSON, NV 89009
Owner Phone: (702) 564-2544
Owner Desc: Private

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Permanently Out of Use
Tank Capacity: 1000
Tank Substance: Diesel
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Copper
Pipe: None
Install Date: 5/7/1983

Federally Regulated Tank: TRUE
Tank ID: 2
Tank Status: Permanently Out of Use
Tank Capacity: 2000
Tank Substance: Gasoline
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Bare Steel
Pipe: None
Install Date: 5/6/1966

Federally Regulated Tank: TRUE
Tank ID: 3
Tank Status: Permanently Out of Use
Tank Capacity: 7500
Tank Substance: Gasoline
Tank Material: Not Listed
Tank: Excavation Liner
Pipe Material: Unknown
Pipe: None
Install Date: 1/1/1941

Federally Regulated Tank: TRUE
Tank ID: 4
Tank Status: Permanently Out of Use
Tank Capacity: 7500
Tank Substance: Gasoline
Tank Material: Not Listed
Tank: Excavation Liner
Pipe Material: Unknown
Pipe: None
Install Date: 1/1/1941

TIMET (Continued) **U003380128**

Federally Regulated Tank:	TRUE
Tank ID:	5
Tank Status:	Permanently Out of Use
Tank Capacity:	7500
Tank Substance:	Gasoline
Tank Material:	Asphalt Coated or Bare Steel
Tank:	Excavation Liner
Pipe Material:	Unknown
Pipe:	None
Install Date:	1/1/1941

Federally Regulated Tank:	TRUE
Tank ID:	6
Tank Status:	Permanently Out of Use
Tank Capacity:	1000
Tank Substance:	Used Oil
Tank Material:	Not Listed
Tank:	Excavation Liner
Pipe Material:	Unknown
Pipe:	None
Install Date:	1/1/1941

Federally Regulated Tank:	TRUE
Tank ID:	7
Tank Status:	Permanently Out of Use
Tank Capacity:	15000
Tank Substance:	Diesel
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Not Listed
Pipe:	None
Install Date:	6/1/1942

A6
< 1/8
1 ft.

Relative:
Higher

Actual:
1814 ft.

TRONOX LLC
8000 W LAKE MEAD DR
HENDERSON, NV 89015

Site 6 of 13 in cluster A

RCRA-TSDF **1000351525**
CERC-NFRAP **89015KRRMC80**
CORRACTS
RCRA-SQG
TRIS
PADS
MANIFEST
HAZNET

RCRA-TSDF:

Date form received by agency:	05/11/2006
Facility name:	TRONOX LLC
Facility address:	8000 LAKE MEAD PKWY HENDERSON, NV 890156619
EPA ID:	NVD008290330
Mailing address:	PO BOX 55 HENDERSON, NV 89009
Contact:	SUSAN M CROWLEY
Contact address:	PO BOX 55 HENDERSON, NV 89009
Contact country:	US
Contact telephone:	702-651-2200
Contact email:	SUSAN.CROWLEY@TRONOX.COM
EPA Region:	09
Land type:	Private

TRONOX LLC (Continued) **1000351525**

Classification: TSDF
Description: Handler is engaged in the treatment, storage or disposal of hazardous waste
TSD commencement date: Not reported

Owner/Operator Summary:
Owner/operator name: TRONOX LLC
Owner/operator address: PO BOX 268859
OKLAHOMA CITY, OK 73126
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 12/29/1967
Owner/Op end date: Not reported

Owner/operator name: TRONOX LLC
Owner/operator address: 8000 LAKE MEAD PKWY
HENDERSON, NV 89015
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 12/29/1967
Owner/Op end date: Not reported

Owner/operator name: KERR-MCGEE CHEMICAL CORPORATION
Owner/operator address: P O BOX 55
CITY NOT REPORTED, NV 99999
Owner/operator country: Not reported
Owner/operator telephone: (702) 565-8901
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: KERR-MCGEE CHEMICAL CORPORATION
Owner/operator address: PO BOX 55
CITY NOT REPORTED, 99999
Owner/operator country: Not reported
Owner/operator telephone: (702) 565-8901
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/0001
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No

TRONOX LLC (Continued) **1000351525**

Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:

Date form received by agency: 03/14/2001
Facility name: TRONOX LLC
Site name: KERR-MCGEE CHEMICAL L.L.C. - HENDERSON
Classification: Large Quantity Generator

Date form received by agency: 05/25/1999
Facility name: TRONOX LLC
Site name: KERR MCGEE CHEMICAL LLC
Classification: Small Quantity Generator

Date form received by agency: 12/14/1998
Facility name: TRONOX LLC
Site name: KERR MCGEE CHEMICAL LLC
Classification: Small Quantity Generator

Date form received by agency: 02/29/1996
Facility name: TRONOX LLC
Site name: KERR-MCGEE CHEMICAL CORP
Classification: Large Quantity Generator

Date form received by agency: 02/28/1994
Facility name: TRONOX LLC
Site name: KERR MCGEE CHEMICAL CORP
Classification: Large Quantity Generator

Date form received by agency: 02/24/1992
Facility name: TRONOX LLC
Site name: KERR MCGEE CHEMICAL CORP.
Classification: Large Quantity Generator

Date form received by agency: 09/25/1990
Facility name: TRONOX LLC
Site name: KERR MCGEE CHEMICAL LLC
Classification: Large Quantity Generator

Date form received by agency: 03/19/1990
Facility name: TRONOX LLC
Site name: KERR-MCGEE CHEMICAL CORP.
Classification: Large Quantity Generator

Hazardous Waste Summary:

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE

TRONOX LLC (Continued) **1000351525**

MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D003
Waste name: A MATERIAL IS CONSIDERED TO BE A REACTIVE HAZARDOUS WASTE IF IT IS NORMALLY UNSTABLE, REACTS VIOLENTLY WITH WATER, GENERATES TOXIC GASES WHEN EXPOSED TO WATER OR CORROSIVE MATERIALS, OR IF IT IS CAPABLE OF DETONATION OR EXPLOSION WHEN EXPOSED TO HEAT OR A FLAME. ONE EXAMPLE OF SUCH WASTE WOULD BY WASTE GUNPOWDER.

Waste code: D005
Waste name: BARIUM

Waste code: D007
Waste name: CHROMIUM

Corrective Action Summary:

Event date: 10/10/1987
Event: RFA Completed, Assessment was an RFA.

Event date: 07/01/1988
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

Event date: 02/25/1992
Event: Stabilization Measures Evaluation,This facility is not amenable to stabilization activity at the present time for reasons other than 1- it appears to be technically infeasible or inappropriate (NF) or 2- there is a lack of technical information (IN). Reasons for this conclusion may be the status of closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other administrative considerations.

Event date: 02/25/1992
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

Event date: 01/01/1997
Event: RFI Imposition

Event date: 11/26/1997
Event: CA Prioritization, Facility or area was assigned a high corrective action priority.

Event date: 01/06/1998
Event: CA074ME

Event date: 05/27/1999
Event: Current Human Exposures under Control, Current human exposures are NOT under control.

Event date: 05/27/1999
Event: Igration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected.

Event date: 09/27/2004
Event: Current Human Exposures under Control, Yes, Current Human Exposures

TRONOX LLC (Continued) **1000351525**

Under Control has been verified. Based on a review of information contained in the EI determination, current human exposures are expected to be under control at the facility under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

Event date: 07/19/2005
Event: Igration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified. Based on a review of information contained in the EI determination, it has been determined that migration of contaminated groundwater is under control at the facility. Specifically, this determination indicates that the migration of contaminated groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the existing area of contaminated groundwater. This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

Event date: 12/14/2006
Event: Date For Remedy Selection (CM Imposed)

Facility Has Received Notices of Violations:
Regulation violated: FR - 262.50-60
Area of violation: Generators - General
Date violation determined: 01/17/1997
Date achieved compliance: 03/04/1997
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.20-23.B
Area of violation: Generators - General
Date violation determined: 03/15/1994
Date achieved compliance: 05/31/1994
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.90-94.F
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 09/13/1993
Date achieved compliance: 11/29/1993
Violation lead agency: State
Enforcement action: Not reported

TRONOX LLC (Continued) **1000351525**

Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 12/17/1991
Date achieved compliance: 01/21/1992
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.140-150.H
Area of violation: TSD - Financial Requirements
Date violation determined: 10/07/1984
Date achieved compliance: 10/29/1984
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 10/07/1984
Date achieved compliance: 10/29/1984
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 07/15/2008
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

TRONOX LLC (Continued) **1000351525**

Evaluation date: 10/12/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/17/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/17/1997
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 03/04/1997
Evaluation lead agency: State

Evaluation date: 03/15/1994
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 05/31/1994
Evaluation lead agency: State

Evaluation date: 09/13/1993
Evaluation: OPERATION AND MAINTENANCE INSPECTION
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 11/29/1993
Evaluation lead agency: State

Evaluation date: 12/17/1991
Evaluation: CASE DEVELOPMENT INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/29/1991
Evaluation: FOLLOW-UP INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/08/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 01/21/1992
Evaluation lead agency: State

Evaluation date: 01/23/1989
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/15/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported

TRONOX LLC (Continued) **1000351525**

Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/30/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/25/1987
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/23/1987
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/12/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/06/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/20/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/29/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/29/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 11/29/1984
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

TRONOX LLC (Continued) **1000351525**

Evaluation date: 10/07/1984
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/07/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 10/29/1984
Evaluation lead agency: State

Evaluation date: 10/07/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - Closure/Post-Closure
Date achieved compliance: 10/29/1984
Evaluation lead agency: State

CERC-NFRAP:
Site ID: 0902934
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 09/01/1979
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 05/01/1980
Priority Level: Low priority for further assessment

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 07/01/1988
Priority Level: Low priority for further assessment

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 03/22/1990
Priority Level: Not reported

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 03/22/1990
Priority Level: NFRAP: No further Remedial Action planned

CORRACTS:

EPA ID: NVD008290330
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/1/1997

TRONOX LLC (Continued) **1000351525**

Action:	CA100 - RFI Imposition
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported
EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	1/6/1998
Action:	CA074ME
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported
EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	2/25/1992
Action:	CA225NR - Stabilization Measures Evaluation, This facility is, not amenable to stabilization activity at the, present time for reasons other than (1) it appears to be technically, infeasible or inappropriate (NF) or (2) there is a lack of technical, information (IN). Reasons for this conclusion may be the status of, closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other, administrative considerations
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported
EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	2/25/1992
Action:	CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported
EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	5/27/1999
Action:	CA725NO - Current Human Exposures Under Control, Current human exposures are NOT under control
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported
EPA ID:	NVD008290330
EPA Region:	9

TRONOX LLC (Continued) **1000351525**

Area Name:	ENTIRE FACILITY
Actual Date:	5/27/1999
Action:	CA750NO - Migration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	7/1/1988
Action:	CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	7/19/2005
Action:	CA750YE - Migration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	9/27/2004
Action:	CA725YE - Current Human Exposures Under Control, Yes, Current Human Exposures Under Control has been verified
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	10/10/1987
Action:	CA050RF - RFA Completed, Assessment was an RFA
NAICS Code(s):	325188 All Other Basic Inorganic Chemical Manufacturing
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	NVD008290330
EPA Region:	9
Area Name:	ENTIRE FACILITY
Actual Date:	11/26/1997

TRONOX LLC (Continued) **1000351525**

Action: CA075HI - CA Prioritization, Facility or area was assigned a high corrective action priority
NAICS Code(s): 325188
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD008290330
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 12/14/2006
Action: CA400 - Date For Remedy Selection (CM Imposed)
NAICS Code(s): 325188
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

PADS:
EPAID: NVD008290330
Facility name: KERR MCGEE CHEM CORP
Facility Address: 8000 LAKE MEAD DR
HENDERSON, NV 89015
Facility country: US
Generator: Yes
Storer: No
Transporter: No
Disposer: No
Research facility: No
Smelter: No
Facility owner name: KERR MCGEE CHEM CORP
Contact title: Not reported
Contact name: CORBETT PATRICK S
Contact tel: (702)565-8901
Contact extension: Not reported
Mailing address: PO BOX 55
HENDERSON, NV 89015
Mailing country: US
Cert. title: Not reported
Cert. name: Not reported
Cert. date: 3/12/1990
Date received: 3/27/1990

NY MANIFEST:
EPA ID: NVD008290330
Country: USA
Mailing Name: KERR-MC GEE CHEMICAL CORP
Mailing Contact: MARK J PORTERFIELD
Mailing Address: PO BOX 55
Mailing Address 2: Not reported
Mailing City: HENDERSON
Mailing State: NV
Mailing Zip: 89015
Mailing Zip4: Not reported
Mailing Country: USA
Mailing Phone: 702-651-2200

TRONOX LLC (Continued) **1000351525**

Document ID:	NYB6898581
Manifest Status:	Completed copy
Trans1 State ID:	1GD422OK
Trans2 State ID:	Not reported
Generator Ship Date:	950328
Trans1 Recv Date:	950328
Trans2 Recv Date:	Not reported
TSD Site Recv Date:	950405
Part A Recv Date:	Not reported
Part B Recv Date:	950417
Generator EPA ID:	NVD008290330
Trans1 EPA ID:	OKD981588791
Trans2 EPA ID:	Not reported
TSDF ID:	NYD048148175
Waste Code:	D007 - CHROMIUM 5.0 MG/L TCLP
Quantity:	00190
Units:	G - Gallons (liquids only)* (8.3 pounds)
Number of Containers:	022
Container Type:	DM - Metal drums, barrels
Handling Method:	R Material recovery of more than 75 percent of the total material.
Specific Gravity:	100
Waste Code:	Not reported
Quantity:	00375
Units:	P - Pounds
Number of Containers:	004
Container Type:	DM - Metal drums, barrels
Handling Method:	L Landfill.
Specific Gravity:	100
Waste Code:	Not reported
Quantity:	00150
Units:	P - Pounds
Number of Containers:	001
Container Type:	DM - Metal drums, barrels
Handling Method:	L Landfill.
Specific Gravity:	100
Year:	95

HAZNET:

Gepaid:	NVD008290330
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 55
Mailing City,St,Zip:	HENDERSON, NV 890090000
Gen County:	99
TSD EPA ID:	CAD050806850
TSD County:	Los Angeles
Waste Category:	Off-specification, aged, or surplus organics
Disposal Method:	Transfer Station
Tons:	.1375
Facility County:	99

Gepaid:	NVD008290330
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported

TRONOX LLC (Continued) **1000351525**

Mailing Name: Not reported
Mailing Address: PO BOX 55
Mailing City,St,Zip: HENDERSON, NV 890090000
Gen County: 99
TSD EPA ID: CAD050806850
TSD County: Los Angeles
Waste Category: Liquids with pH <UN-> 2
Disposal Method: Treatment, Tank
Tons: .0875
Facility County: 99

Gepaid: NVD008290330
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 55
Mailing City,St,Zip: HENDERSON, NV 890090000
Gen County: 99
TSD EPA ID: CAD050806850
TSD County: Los Angeles
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: Recycler
Tons: .0750
Facility County: 99

Gepaid: NVD008290330
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 55
Mailing City,St,Zip: HENDERSON, NV 890090000
Gen County: 99
TSD EPA ID: CAD981696420
TSD County: Los Angeles
Waste Category: Waste oil and mixed oil
Disposal Method: Transfer Station
Tons: 2.9815
Facility County: 99

Gepaid: NVD008290330
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 55
Mailing City,St,Zip: HENDERSON, NV 890090000
Gen County: 99
TSD EPA ID: CAD097030993
TSD County: Los Angeles
Waste Category: Not reported
Disposal Method: Recycler
Tons: 1.6500
Facility County: 99

TRONOX LLC (Continued) **1000351525**

Click this hyperlink while viewing on your computer to access
25 additional CA_HAZNET: record(s) in the EDR Site Report.

A7 **SAME AS 8000693** **UST** **U003380548**
8000 WEST LAKE MEAD DRIVE BMI COMPLEX **N/A**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 7 of 13 in cluster A

Relative:
Higher

Actual:
1814 ft.

UST:
Facility ID: 8-001322

Owner:
Owner: TIMET
Owner Address: PO BOX 2128
Owner City,St,Zip: HENDERSON, NV 89009
Owner Phone: (702) 564-2544
Owner Desc: Private

Federally Regulated Tank: Not reported
Tank ID: Not reported
Tank Status: Not reported
Tank Capacity: Not reported
Tank Substance: Not reported
Tank Material: Not reported
Tank: Not reported
Pipe Material: Not reported
Pipe: Not reported
Install Date: Not reported

A8 **JACK B. KELLEY, INC.** **SHWS** **S103877710**
8000 WEST LAKE MEAD DRIVE **N/A**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 8 of 13 in cluster A

Relative:
Higher

Actual:
1814 ft.

SHWS:
Facility ID: 8-001374
Date Release Reported to NDEP: 06/07/1991
Program: _
NDEP Case Officer: CCHD
Location of Paper File: CCHD: Las Vegas
Type of Media Impacted: _
Event: Not reported
Date of Closure: **05/12/1992**
Regulatory Type of Closure: _
Contaminant: _

A9
< 1/8
1 ft.

SAGUARO POWER COMPANY
8000 WEST LAKE MEAD DRIVE
HENDERSON, NV 89015

RCRA-CESQG 1004565908
FINDS NVD986775948
HMRI

Site 9 of 13 in cluster A

Relative:
Higher

Actual:
1814 ft.

RCRA-CESQG:

Date form received by agency:	02/11/1994
Facility name:	SAGUARO POWER CO
Facility address:	8000 LAKE MEAD DR HENDERSON, NV 89014
EPA ID:	NVD986775948
Mailing address:	18101 VON KARMAN AVE STE 1700 IRVINE, CA 927151007
Contact:	SHERYL CHENIN-WEBB
Contact address:	P O BOX 90849 HENDERSON, NV 890090849
Contact country:	US
Contact telephone:	(702) 564-8215
Contact email:	Not reported
EPA Region:	09
Land type:	Private
Classification:	Conditionally Exempt Small Quantity Generator
Description:	Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	SAGUARO POWER CO
Owner/operator address:	P O BOX 90849 HENDERSON, NV 89009
Owner/operator country:	Not reported
Owner/operator telephone:	(702) 564-8215
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No

SAGUARO POWER COMPANY (Continued) **1004565908**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Verified to be non-commercial

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 05/04/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110000757020

Environmental Interest/Information System
Not reported

Nevada Facility Profile (NV-FP) system contains facility based, integrated environmental information for the State of Nevada.

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

US Emissions & Generation Resource Database (EGRID) contains data on emissions and resource mix for virtually every power plant and company that generates electricity in the United States.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

US EPA RACT/BACT/LAER Clearinghouse (RBLC) database contains case-specific information on the "Best Available" air pollution

SAGUARO POWER COMPANY (Continued) **1004565908**

technologies that have been required to reduce the emission of air pollutants from stationary sources (e.g., power plants, steel mills, chemical plants, etc.). RACT, or Reasonably Available Control Technology, is required on existing sources in areas that are not meeting national ambient air quality standards. BACT, or Best Available Control Technology, is required on major new or modified sources in clean areas. LAER, or Lowest Achievable Emission Rate, is required on major new or modified sources in non-attainment areas.

US EPA Risk Management Plan (RMP) database stores the risk management plans reported by companies that handle, manufacture, use, or store certain flammable or toxic substances, as required under section 112(r) of the Clean Air Act (CAA).

HMRI:

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7647-01-0
Quantity: 6000 GAL
Chemical Name: MURATIC ACID

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 5329-14-6
Quantity: 1 LBS
Chemical Name: ACID REAGENT

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 10034-88-8
Quantity: 1 GAL
Chemical Name: MOLYBDATE 3 REAGENT

SAGUARO POWER COMPANY (Continued) **1004565908**

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 102-71-6
Quantity: 1 GAL
Chemical Name: HARDNESS BUFFER SOLUTION

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 67-63-0
Quantity: 2 GAL
Chemical Name: PHENOLPHTHALEIN SOLUTION

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 67-64-1
Quantity: 90 GAL
Chemical Name: PAINTS

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7727-37-9
Quantity: 1750 SFT
Chemical Name: CALIBRATION GAS

Facility Rec#: 826

SAGUARO POWER COMPANY (Continued) **1004565908**

Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 69-72-7
Quantity: 1 GAL
Chemical Name: STARCH INDICATOR SOLUTION

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 13463-67-7
Quantity: 90000 LBS
Chemical Name: SCR CATALYST

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 64742-46-7
Quantity: 115000 LBS
Chemical Name: DIELECTRIC TRANSFORMER OIL

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7601-54-9
Quantity: 200 LBS
Chemical Name: TRISODIUM PHOSPHATE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY

SAGUARO POWER COMPANY (Continued) **1004565908**

Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7558-79-4
Quantity: 200 LBS
Chemical Name: DISODIUM PHOSPHATE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7558-80-7
Quantity: 200 LBS
Chemical Name: MONOSODIUM PHOSPHATE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 630-08-0
Quantity: 450 SFT
Chemical Name: CALIBRATION GAS

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 6381-77-7
Quantity: 1000 LBS
Chemical Name: CHEMTREAT BL-1240

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY

SAGUARO POWER COMPANY (Continued) **1004565908**

Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 4827-55-8
Quantity: 30 GAL
Chemical Name: SULLAIR OIL

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 74-98-6
Quantity: 750 LBS
Chemical Name: PROPANE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 64742-62-7
Quantity: 970 GAL
Chemical Name: SOLVENT DEWAXED RES OIL

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 112-34-5
Quantity: 165 GAL
Chemical Name: FYREWASH

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported

SAGUARO POWER COMPANY (Continued) **1004565908**

Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7772-98-7
Quantity: 1 LBS
Chemical Name: FERRO VER IRON REAGENT

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 13537-24-1
Quantity: 1 GAL
Chemical Name: FERRIC ION SOLUTION

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7697-37-2
Quantity: 1 GAL
Chemical Name: DEHA REAGENT

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 124-38-9
Quantity: 6000 LBS
Chemical Name: CARBON DIOXIDE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134

SAGUARO POWER COMPANY (Continued) **1004565908**

Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 57-55-6
Quantity: 165 GAL
Chemical Name: ANTIFREEZE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7646-85-7
Quantity: 5000 LBS
Chemical Name: ZINC CHLORIDE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 108-91-8
Quantity: 4000 LBS
Chemical Name: CYCLOHEXYLAMINE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 110-91-8
Quantity: 4500 LBS
Chemical Name: MORPHOLINE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W

SAGUARO POWER COMPANY (Continued) **1004565908**

Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 1310-58-3
Quantity: 5000 LBS
Chemical Name: SCALE INHIBITOR

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 6381-77-7
Quantity: 1000 LBS
Chemical Name: OXYGEN SCAVENGER

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7681-52-9
Quantity: 700 GAL
Chemical Name: BLEACH

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 74-86-2
Quantity: 500 CFT
Chemical Name: ACETYLENE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736

SAGUARO POWER COMPANY (Continued) **1004565908**

Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7631-90-5
Quantity: 200 LBS
Chemical Name: SODIUM BISULFITE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 1310-73-2
Quantity: 75000 LBS
Chemical Name: CAUSTIC SODA

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 68476-34-6
Quantity: 200000 GAL
Chemical Name: DIESEL

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7727-37-9
Quantity: 9072 CFT
Chemical Name: NITROGEN

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H

SAGUARO POWER COMPANY (Continued) **1004565908**

Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7727-21-1
Quantity: 2 LBS
Chemical Name: POTASSIUM PERSULFATE

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7782-44-7
Quantity: 3000 SFT
Chemical Name: OXYGEN

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7664-93-9
Quantity: 5525 LBS
Chemical Name: SULFURIC ACID

Facility Rec#: 826
Contact Name: FLASHBERG,LARRY
Facility Contact2: FLASHBERG,LARRY
Facility Contact3: Not reported
Phone Number 1: (702)558-1134
Phone Type 1: W
Phone Number 2: (702)456-1736
Phone Type 2: H
Phone Number 3: Not reported
Phone Type 3: Not reported
Case Number: 7664-41-7
Quantity: 52000 LBS
Chemical Name: ANHYDROUS AMMONIA

A10 **FORMER STAUFFER CHEMICAL CO FACILITY** **RCRA-SQG** **1010324990**
8000 LAKE MEAD PKWY GATE 1 **HAZNET** **NVR000081737**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 10 of 13 in cluster A

Relative:
Higher

Actual:
1814 ft.

RCRA-SQG:

Date form received by agency:	11/21/2006
Facility name:	FORMER STAUFFER CHEMICAL CO FACILITY
Facility address:	8000 LAKE MEAD PKWY GATE 1 HENDERSON, NV 89015
EPA ID:	NVR000081737
Mailing address:	PES ENVIRONMENTAL INC 1682 NOVATO BLVD STE 100 NOVATO, CA 94947
Contact:	NICHOLAS POGONCHEFF
Contact address:	PES ENVIRONMENTAL INC 1682 NOVATO BLVD STE 100 NOVATO, CA 94947
Contact country:	US
Contact telephone:	415-899-1600
Contact email:	NPOGONCHEFF@PESENV.COM
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	PIONEER AMERICAS LLC
Owner/operator address:	8000 LAKE MEAD PKWY GATE 1 HENDERSON, NV 89015
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	08/29/1988
Owner/Op end date:	Not reported

Owner/operator name:	STAUFFER MGMT CO LLC - B SPILLER
Owner/operator address:	1800 CONCORD PIKE WILMINGTON, DE 19850
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	07/26/2006
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No

FORMER STAUFFER CHEMICAL CO FACILITY (Continued) **1010324990**

On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Hazardous Waste Summary:
Waste code: D013
Waste name: LINDANE

Waste code: D018
Waste name: BENZENE

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 03/02/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/15/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

HAZNET:
Gepaid: NVR000081737
Contact: NICHOLAS POGONCHEFF
Telephone: 4158991600
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PES ENVIRONMENTAL INC 1682 NOVATO B
Mailing City,St,Zip: NOVATO, CA 949470000
Gen County: 99
TSD EPA ID: NVT330010000
TSD County: 99
Waste Category: Not reported
Disposal Method: H132
Tons: 0.45
Facility County: 99

Gepaid: NVR000081737
Contact: NICHOLAS POGONCHEFF
Telephone: 4158991600
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PES ENVIRONMENTAL INC 1682 NOVATO B
Mailing City,St,Zip: NOVATO, CA 949470000
Gen County: 99

FORMER STAUFFER CHEMICAL CO FACILITY (Continued) **1010324990**

TSD EPA ID: CAD028409019
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: H141
Tons: 0.0715
Facility County: 99

A11 **W.S. HATCH CO.** **UST** **U003380197**
8000 W LAKE MEAD BLVD **N/A**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 11 of 13 in cluster A

Relative: Higher

UST:
Facility ID: 8-000777

Actual: 1814 ft.

Owner:
Owner: JACK B KELLY CO
Owner Address: 8000 W LAKE MEAD
Owner City,St,Zip: HENDERSON, NV 89015
Owner Phone: ( ) -
Owner Desc: Not Listed

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Permanently Out of Use
Tank Capacity: 10000
Tank Substance: Diesel
Tank Material: Fiberglass Reinforced Plastic
Tank: None
Pipe Material: Bare Steel
Pipe: None
Install Date: 5/14/1980

A12 **JONES CHEMICALS INC** **RCRA-NonGen** **1000220724**
8000 W LAKE MEAD DR SITE B **FINDS** **NVD008326936**
< 1/8 **HENDERSON, NV 89015**
1 ft.

Site 12 of 13 in cluster A

Relative: Higher

RCRA-NonGen:
Date form received by agency: 03/25/1997
Facility name: JONES CHEMICALS INC
Facility address: 8000 W LAKE MEAD DR SITE B
HENDERSON, NV 89015
EPA ID: NVD008326936
Mailing address: P O BOX 90097
HENDERSON, NV 89015
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Non-Generator

Actual: 1814 ft.

JONES CHEMICALS INC (Continued) **1000220724**

Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: JONES CHEMICALS INC WESTERN DIVISION
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Verified to be non-commercial

Historical Generators:
Date form received by agency: 04/24/1992
Facility name: JONES CHEMICALS INC
Classification: Conditionally Exempt Small Quantity Generator

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 03/25/1997
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

JONES CHEMICALS INC (Continued) **1000220724**

Evaluation date: 06/29/1983
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

FINDS:

Registry ID: 110004287021

Environmental Interest/Information System

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

A13 **SAGUARO POWER PLANT** **SHWS** **S103877224**
8000 WEST LAKE MEAD DRIVE **N/A**
< 1/8 **HENDERSON, NV**
1 ft.

Site 13 of 13 in cluster A

Relative: Higher

Actual: 1814 ft.

SHWS:
Facility ID: H-001220
Date Release Reported to NDEP: 05/01/1994
Program: _
NDEP Case Officer: bpohlman
Location of Paper File: NDEP: Las Vegas
Type of Media Impacted: Soil
Event: Not reported
Date of Closure: 10/18/1995
Regulatory Type of Closure: _
Contaminant: _ ; Lube Oil

B14 **TARGET CORPORATION STORE NO.2404** **RCRA-SQG** **1011844205**
South **350 W LAKE MEAD PKWY** **NVR000083741**
< 1/8 **HENDERSON, NV 89015**
0.094 mi.
497 ft. **Site 1 of 4 in cluster B**

Relative: Higher

Actual: 1884 ft.

RCRA-SQG:
Date form received by agency: 09/02/2008
Facility name: TARGET CORPORATION STORE NO.2404
Facility address: 350 W LAKE MEAD PKWY
HENDERSON, NV 89015 7088
EPA ID: NVR000083741
Mailing address: P O BOX 111
MINNEAPOLIS, MN 55440 0111

TARGET CORPORATION STORE NO.2404 (Continued) **1011844205**

Contact:	JILL GILCHRIST
Contact address:	P O BOX 111 MINNEAPOLIS, MN 55440 0111
Contact country:	US
Contact telephone:	800-587-2228
Contact email:	ENVIRONMENTAL MANAGER
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	TARGET CORPORATION
Owner/operator address:	P O BOX 111 MINNEAPOLIS, MN 55440
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	07/27/2008
Owner/Op end date:	Not reported

Owner/operator name:	TARGET CORPORATION
Owner/operator address:	P O BOX 111 MINNEAPOLIS, MN 55440
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	07/27/2008
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Hazardous Waste Summary:

Waste code:	D001

TARGET CORPORATION STORE NO.2404 (Continued) **1011844205**

Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 09/18/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

B15 **JIM S UNION** **EDR Historical Auto Stations** **1009371730**
South **401 W LAKE MEAD DR** **N/A**
< 1/8 **LAS VEGAS, NV**
0.111 mi.
588 ft. **Site 2 of 4 in cluster B**

Relative: Higher

EDR Historical Auto Stations:
Name: JIM S UNION
Year: 1970
Type: AUTOMOBILE SERVICE STATIONS

Actual: 1886 ft.

B16 **BASIC MTR SERV** **EDR Historical Auto Stations** **1009373295**
South **433 W LAKE MEAD DR** **N/A**
< 1/8 **LAS VEGAS, NV**
0.114 mi.
600 ft. **Site 3 of 4 in cluster B**

Relative: Higher

EDR Historical Auto Stations:
Name: BASIC MTR SERV
Year: 1970
Type: AUTOMOBILE REPAIRING

Actual: 1886 ft.

B17 **LAKE MEAD AUTO MARINE** **UST** **U003380354**
South **433 WEST LAKE MEAD DRIVE** **N/A**
< 1/8 **HENDERSON, NV 89015**
0.115 mi.
605 ft. **Site 4 of 4 in cluster B**

Relative:
Higher

Actual:
1887 ft.

UST:
Facility ID: 8-000973

Owner:
Owner: G&P RENTAL DEVELOPMENT CORP.
Owner Address: 433 WEST LAKE MEAD DRIVE
Owner City,St,Zip: HENDERSON, NV 89015
Owner Phone: (702) 565-6050
Owner Desc: Commercial

Federally Regulated Tank: Not reported
Tank ID: Not reported
Tank Status: Not reported
Tank Capacity: Not reported
Tank Substance: Not reported
Tank Material: Not reported
Tank: Not reported
Pipe Material: Not reported
Pipe: Not reported
Install Date: Not reported

C18 **OK TIRE STORES** **EDR Historical Auto Stations** **1009375603**
South **505 LAKE MEAD DR** **N/A**
< 1/8 **LAS VEGAS, NV**
0.120 mi.
631 ft. **Site 1 of 2 in cluster C**

Relative:
Higher

Actual:
1886 ft.

EDR Historical Auto Stations:
Name: OK TIRE STORES
Year: 1970
Type: AUTOMOBILE BRAKE SERVICE

C19 **HAFENS OK TIRE STORE** **RCRA-CESQG** **1000413687**
South **505 W LAKE MEAD DR** **FINDS** **NVD981668767**
< 1/8 **HENDERSON, NV 89015**
0.121 mi.
639 ft. **Site 2 of 2 in cluster C**

Relative:
Higher

Actual:
1887 ft.

RCRA-CESQG:
Date form received by agency: 02/27/1992
Facility name: HAFENS OK TIRE STORE
Facility address: 505 W LAKE MEAD DR
HENDERSON, NV 89015
EPA ID: NVD981668767
Contact: DENNIS HAFEN
Contact address: 505 W LAKE MEAD DR
HENDERSON, NV 89015
Contact country: US
Contact telephone: (702) 564-5312
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Conditionally Exempt Small Quantity Generator

HAFENS OK TIRE STORE (Continued) **1000413687**

Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	DENNIS HAFEN
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Verified to be non-commercial

Violation Status: No violations found

HAFENS OK TIRE STORE (Continued) **1000413687**

Evaluation Action Summary:
Evaluation date: 02/04/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 07/18/1996
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

FINDS:

Registry ID: 110004290295

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

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20 **REBEL OIL #68** **UST** **U003380963**
South **601 W. LAKE MEAD DR** **N/A**
1/8-1/4 **HENDERSON, NV 89015**
0.144 mi.
760 ft.

Relative:
Higher

Actual:
1886 ft.

UST:
Facility ID: 8-001840

Owner:
Owner: REBEL OIL COMPANY INC
Owner Address: 2200 S HIGHLAND DR
Owner City,St,Zip: LAS VEGAS, NV 89102
Owner Phone: (702) 382-5866
Owner Desc: Private

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Currently In Use
Tank Capacity: 12000
Tank Substance: Gasoline
Tank Material: Composite (Steel w/ FRP)
Tank: Double-Walled
Pipe Material: Fiberglass Reinforced Plastic
Pipe: Double-Walled
Install Date: 2/1/1997

Federally Regulated Tank: TRUE
Tank ID: 2
Tank Status: Currently In Use
Tank Capacity: 12000
Tank Substance: Gasoline

REBEL OIL #68 (Continued) **U003380963**

Tank Material:	Composite (Steel w/ FRP)
Tank:	Double-Walled
Pipe Material:	Fiberglass Reinforced Plastic
Pipe:	Double-Walled
Install Date:	2/1/1997
Federally Regulated Tank:	TRUE
Tank ID:	3
Tank Status:	Currently In Use
Tank Capacity:	12000
Tank Substance:	Gasoline
Tank Material:	Composite (Steel w/ FRP)
Tank:	Double-Walled
Pipe Material:	Fiberglass Reinforced Plastic
Pipe:	Double-Walled
Install Date:	2/1/1997
Federally Regulated Tank:	TRUE
Tank ID:	4
Tank Status:	Currently In Use
Tank Capacity:	12000
Tank Substance:	Gasoline
Tank Material:	Composite (Steel w/ FRP)
Tank:	Double-Walled
Pipe Material:	Fiberglass Reinforced Plastic
Pipe:	Double-Walled
Install Date:	2/1/1997
Federally Regulated Tank:	TRUE
Tank ID:	5
Tank Status:	Currently In Use
Tank Capacity:	8000
Tank Substance:	Diesel
Tank Material:	Composite (Steel w/ FRP)
Tank:	Double-Walled
Pipe Material:	Fiberglass Reinforced Plastic
Pipe:	Double-Walled
Install Date:	2/1/1997
Federally Regulated Tank:	TRUE
Tank ID:	6
Tank Status:	Currently In Use
Tank Capacity:	4000
Tank Substance:	Gasoline
Tank Material:	Composite (Steel w/ FRP)
Tank:	Double-Walled
Pipe Material:	Fiberglass Reinforced Plastic
Pipe:	Double-Walled
Install Date:	2/1/1997

21
ENE
1/8-1/4
0.152 mi.
800 ft.

PLANCOR 201-C
HENDERSON, NV

FUDS **1007212037**
N/A

Relative:
Higher

Actual:
1840 ft.

FUDS:

Federal Facility ID:	NV9799F6039
FUDS #:	J09NV1090
INST ID:	61398
Facility Name:	PLANCOR 201-C
City:	HENDERSON
State:	NV
EPA Region:	9
County:	CLARK
Congressional District:	03
US Army District:	Los Angeles District (SPL)
Fiscal Year:	2009
Telephone:	213-452-3920
NPL Status:	Not reported
RAB:	Not reported
CTC:	176.97114
Current Owner:	OTHER

FUDS Description Details:

Plancor 201-C was located in Henderson, Nevada..

FUDS History Details:

Inventory project report will not be done until FY03.

FUDS Current Program Details:

FUDS Future Program Details:

D22
South
1/8-1/4
0.152 mi.
802 ft.

VACANT PARCEL
631 W LAKE MEAD DR
HENDERSON, NV 89015
Site 1 of 2 in cluster D

UST **U003380921**
N/A

Relative:
Higher

Actual:
1885 ft.

UST:

Facility ID:	8-001793

Owner:

Owner:	REBEL OIL COMPANY INC
Owner Address:	2200 S HIGHLAND DR
Owner City,St,Zip:	LAS VEGAS, NV 89102
Owner Phone:	(702) 382-5866
Owner Desc:	Private
Federally Regulated Tank:	TRUE
Tank ID:	1
Tank Status:	Permanently Out of Use
Tank Capacity:	4000
Tank Substance:	Gasoline
Tank Material:	Not Listed
Tank:	None
Pipe Material:	Unknown
Pipe:	None

VACANT PARCEL (Continued) **U003380921**

Install Date:	Not reported
Federally Regulated Tank:	TRUE
Tank ID:	2
Tank Status:	Permanently Out of Use
Tank Capacity:	2000
Tank Substance:	Gasoline
Tank Material:	Not Listed
Tank:	None
Pipe Material:	Unknown
Pipe:	None
Install Date:	Not reported
Federally Regulated Tank:	FALSE
Tank ID:	3
Tank Status:	Permanently Out of Use
Tank Capacity:	600
Tank Substance:	Heating Oil
Tank Material:	Not Listed
Tank:	None
Pipe Material:	Unknown
Pipe:	None
Install Date:	Not reported

D23
South
1/8-1/4
0.152 mi.
802 ft.

D.A. HEIL-DEL AUGUST COMPANY **SHWS** **S103876936**
631 WEST LAKE MEAD DRIVE **N/A**
HENDERSON, NV 89015

Site 2 of 2 in cluster D

Relative:
Higher

Actual:
1885 ft.

SHWS:

Facility ID:	H-000485
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**04/04/1997**
Regulatory Type of Closure:	Clean Close
Contaminant:	_

24
ESE
1/8-1/4
0.161 mi.
848 ft.

SAME AS 8000693 **UST** **U003380671**
LAKE MEAD & ATLANTIC AVE. **N/A**
HENDERSON, NV 89015

Relative:
Higher

Actual:
1886 ft.

UST:

Facility ID:	8-001466

Owner:

Owner:	TITANIUM METALS CORP
Owner Address:	1999 BROADWAY SUITE 4300
Owner City,St,Zip:	DENVER, CO 80202
Owner Phone:	(303) 296-5600
Owner Desc:	Private

SAME AS 8000693 (Continued) **U003380671**

Federally Regulated Tank:	Not reported
Tank ID:	Not reported
Tank Status:	Not reported
Tank Capacity:	Not reported
Tank Substance:	Not reported
Tank Material:	Not reported
Tank:	Not reported
Pipe Material:	Not reported
Pipe:	Not reported
Install Date:	Not reported

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25 SSW 1/8-1/4 0.161 mi. 849 ft.

HENDERSON SERVICE CENTER
680 LAKE MEAD DR
HENDERSON, NV 89015

LUST UST **U003379922 N/A**

Relative: Higher

Actual: 1880 ft.

LUST:

Facility ID:	8-000456
Program:	LUST
Type of Media Impacted:	Soil
Event:	Confirmed Release
Contaminant:	Gasoline ; Site temporarly transferred to Sara on April 1, 2005; for review and update
Closure Date:	Not reported
Closure Type:	Not reported
Date Reported to NDEP:	12/07/1999
Flag:	ACTIVE
NDEP Case Officer:	tcroft
Location of Paper File:	NDEP: Las Vegas

UST:

Facility ID:	8-000456

Owner:

Owner:	NEVADA POWER COMPANY
Owner Address:	ATTN: ACCOUNTS PAYABLE-S4A60 P.O. BOX 10100
Owner City,St,Zip:	RENO, NV 89520
Owner Phone:	(775) 834-3300
Owner Desc:	Private
Federally Regulated Tank:	TRUE
Tank ID:	1
Tank Status:	Temporarily Out of Use
Tank Capacity:	12000
Tank Substance:	Gasoline
Tank Material:	Fiberglass Reinforced Plastic
Tank:	None
Pipe Material:	Bare Steel
Pipe:	Cathodically Protected
Install Date:	4/11/1981
Federally Regulated Tank:	TRUE
Tank ID:	2
Tank Status:	Currently in Use
Tank Capacity:	2000
Tank Substance:	Used Oil
Tank Material:	Fiberglass Reinforced Plastic

HENDERSON SERVICE CENTER (Continued) **U003379922**

Tank: None
Pipe Material: No Piping
Pipe: None
Install Date: 5/8/1986

26
ENE
1/8-1/4
0.169 mi.
893 ft.

JONES CHEMICALS INC
LAKE MEAD DR
HENDERSON, NV 89015

UST **U003379749**
N/A

Relative:
Higher

Actual:
1821 ft.

UST:
Facility ID: 8-000244

Owner:
Owner: JONES CHEMICALS INC
Owner Address: LAKE MEAD DR
Owner City,St,Zip: HENDERSON, NV 89015
Owner Phone: (702) 565-0897
Owner Desc: Private

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Permanently Out of Use
Tank Capacity: 2500
Tank Substance: Not Listed
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Other
Pipe: None
Install Date: 5/5/1966

Federally Regulated Tank: TRUE
Tank ID: 2
Tank Status: Permanently Out of Use
Tank Capacity: 750
Tank Substance: Not Listed
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Other
Pipe: None
Install Date: 5/5/1966

E27
NNE
1/8-1/4
0.178 mi.
940 ft.

TRI CITY MTRS
1135 N BOULDER
LAS VEGAS, NV

Site 1 of 2 in cluster E

EDR Historical Auto Stations **1009353813**
N/A

Relative:
Lower

Actual:
1710 ft.

EDR Historical Auto Stations:
Name: TRI CITY MTRS
Year: 1970
Type: AUTOMOBILE REPAIRING

28
WSW
1/8-1/4
0.181 mi.
956 ft.

PHILLIPS SERVICES — **SWRCY** — **S109236459**
8390 SO. 4TH STREET, SUITE C 89015 — **N/A**
HENDERSON, NV

Relative:
Higher

Actual:
1861 ft.

NV SWRCY:

Facility Type:	Not reported
Phone:	702-267-0563
Provide Pick-up:	Not reported
Aluminum:	Not reported
Batteries/Household:	Not reported
Cardboard:	Not reported
Carpet Padding:	Not reported
Cell Phones:	Not reported
Computers:	Not reported
Computer Disks:	Not reported
Cooking Oil/Grease:	Not reported
Flourescent Lamps:	X
Food/Yard Waste:	Not reported
Glass Containers:	Not reported
Laser/Ink Jet Cartridges:	Not reported
Magazines:	Not reported
Mattresses:	Not reported
Newspaper:	Not reported
Paint:	Not reported
Pallets:	Not reported
Paper-Mixed:	Not reported
Paper Shredding:	Not reported
Plastic:	Not reported
Scrap Metal:	Not reported
Shink Wrap:	Not reported
Telephone Books:	Not reported
Wood:	Not reported
Comments:	Not reported
Additional Notes:	Provides collection services for hazardous materials.

E29
NNE
1/8-1/4
0.196 mi.
1037 ft.

BLVD S NO 3 — **EDR Historical Auto Stations** — **1009353828**
1136 N BOULDER HWY — **N/A**
LAS VEGAS, NV

Site 2 of 2 in cluster E

Relative:
Lower

Actual:
1709 ft.

EDR Historical Auto Stations:

Name:	BLVD S NO 3
Year:	1970
Type:	AUTOMOBILE SERVICE STATIONS

30
South
1/8-1/4
0.208 mi.
1100 ft.

CENTRAL TELEPHONE COMPANY — **UST** — **U003379607**
681 W LAKE MEAD BLVD HNDN POLEYARD — **N/A**
HENDERSON, NV 89015

Relative:
Higher

Actual:
1895 ft.

UST:

Facility ID:	8-000071

Owner:

Owner:	SPRINT CENTRAL TELEPHONE COMPANY

CENTRAL TELEPHONE COMPANY (Continued) **U003379607**

Owner Address: ATTN DENNIS DOULDER 330 S VALLEY VIEW BLVD
Owner City,St,Zip: LAS VEGAS, NV 89107
Owner Phone: (702) 244-7935
Owner Desc: Commercial

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Permanently Out of Use
Tank Capacity: 500
Tank Substance: Gasoline
Tank Material: Not Listed
Tank: None
Pipe Material: Unknown
Pipe: None
Install Date: 1/21/1960

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31 South 1/8-1/4 0.226 mi. 1194 ft.

MOCKETT ENTERPRISES **RCRA-NonGen** **1000269939**
121 INDUSTRIAL PARK RD #104 **FINDS** **NVT982509580**
HENDERSON, NV 89015

Relative: Higher

Actual: 1888 ft.

RCRA-NonGen:
Date form received by agency: 11/08/2002
Facility name: MOCKETT ENTERPRISES
Facility address: 121 INDUSTRIAL PARK RD #104
HENDERSON, NV 89015
EPA ID: NVT982509580
Mailing address: ANTIGUA
NEWPORT BEACH, CA 92660
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: WILLIAM MOCKETT
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private

MOCKETT ENTERPRISES (Continued) **1000269939**

Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Verified to be non-commercial

Violation Status: No violations found

FINDS:

Registry ID: 110006092272

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

32
North
1/8-1/4
0.245 mi.
1291 ft.

Relative:
Lower

Actual:
1702 ft.

AMERICAN SHOOTERS **RCRA-CESQG** **1012184700**
1212 N BOULDER HIGHWAY **NVR000084483**
HENDERSON, NV 89011

RCRA-CESQG:
Date form received by agency: 04/30/2009
Facility name: AMERICAN SHOOTERS
Facility address: 1212 N BOULDER HIGHWAY
HENDERSON, NV 89011
EPA ID: NVR000084483
Mailing address: 3440 ARVILLE ST
LAS VEGAS, NV 89102
Contact: REGGIE JOHNSON
Contact address: 3440 ARVILLE ST
LAS VEGAS, NV 89102
Contact country: US
Contact telephone: 702-719-5000
Contact email: Not reported
EPA Region: 09

AMERICAN SHOOTERS (Continued) **1012184700**

Land type: Private
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name: AMERICAN SHOOTERS
Owner/operator address: 1212 N BOULDER HWY
HENDERSON, NV 89011
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 09/01/2008
Owner/Op end date: Not reported

Owner/operator name: AMERICAN SHOOTERS
Owner/operator address: 2316 ARAGON CANYON ST
LAS VEGAS, NV 89135
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 09/01/2008
Owner/Op end date: Not reported

Handler Activities Summary:

U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

AMERICAN SHOOTERS (Continued) **1012184700**

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Lamps
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Pesticides
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Thermostats
Accumulated waste on-site: No
Generated waste on-site: Not reported

Hazardous Waste Summary:
Waste code: D008
Waste name: LEAD

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 08/24/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

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33 **CHEMSTAR - BMI COMPLEX** **UST** **U003379721**
SSW **E ST. BETWEEN PIONEER CHLORALKAL AND KERR MCGEE PL** **N/A**
1/8-1/4 **HENDERSON, NV 89015**
0.250 mi.
1319 ft.

Relative: Higher

Actual: 1882 ft.

UST:
Facility ID: 8-000210

Owner:
Owner: CHEMICAL LIME CO
Owner Address: PO BOX 3609
Owner City,St,Zip: NORTH LAS VEGAS, NV 89036
Owner Phone: (702) 643-7702
Owner Desc: Commercial

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Permanently Out of Use
Tank Capacity: 1000
Tank Substance: Diesel
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Bare Steel
Pipe: None
Install Date: 5/8/1956

34 East 1/4-1/2 0.297 mi. 1569 ft.

MONTROSE CHEMICAL CORPORATION OF CA -HEN
LAKE MEAD DR
HENDERSON, NV 89015

RCRA-TSDF
CERC-NFRAP
CORRACTS
RCRA-LQG
FINDS

1000420365
NVD008237489

Relative: Higher

Actual: 1879 ft.

RCRA-TSDF:

Date form received by agency:	02/22/2008
Facility name:	MONTROSE CHEMICAL CORPORATION OF CA -HEN
Site name:	MONTROSE CHEMICAL CORPORATION OF CA -HENDERSON, NEVADA SITE
Facility address:	8000 LAKE MEAD DRIVE HENDERSON, NV 89015
EPA ID:	NVD008237489
Mailing address:	ERICKSON AVENUE, NE SUITE 380 BAINBRIDGE ISLAND, WA 98110
Contact:	PAUL SUNDBERG
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	(209) 474-3617
Contact email:	PVSMRS@PACBELL.NET
EPA Region:	09
Land type:	Private
Classification:	TSDF
Description:	Handler is engaged in the treatment, storage or disposal of hazardous waste
TSD commencement date:	Not reported
Classification:	Large Quantity Generator
Description:	Handler: generates 1,000 kg or more of hazardous waste during any calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Owner/Operator Summary:

Owner/operator name:	MONTROSE CHEMICAL CORPORATION OF CA
Owner/operator address:	Not reported Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	09/01/1988
Owner/Op end date:	Not reported
Owner/operator name:	OLIN CORPORATION
Owner/operator address:	LAKE MEAD DRIVE HENDERSON, NV 89015
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Owner/Operator Type: Owner
Owner/Op start date: 05/20/2007
Owner/Op end date: Not reported

Owner/operator name: MONTROSE CHEMICAL CORPORATION OF CALIF
Owner/operator address: PO BOX E
UNION, NJ 07083
Owner/operator country: Not reported
Owner/operator telephone: (201) 964-3250
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Lamps
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Pesticides
Accumulated waste on-site: No
Generated waste on-site: Not reported

Waste type: Thermostats
Accumulated waste on-site: No
Generated waste on-site: Not reported

Historical Generators:
Date form received by agency: 11/13/2006
Facility name: MONTROSE CHEMICAL CORPORATION OF CA -HEN
Site name: MONTROSE CHEM CORP OF CA HENDERSON SITE
Classification: Large Quantity Generator

Date form received by agency: 05/25/1999

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Facility name: MONTROSE CHEMICAL CORPORATION OF CA -HEN
Site name: MONTROSE CHEM CORP OF CA
Classification: Not a generator, verified

Date form received by agency: 10/25/1993
Facility name: MONTROSE CHEMICAL CORPORATION OF CA -HEN
Site name: MONTROSE CHEM CORP OF CA
Classification: Large Quantity Generator

Date form received by agency: 10/25/1993
Facility name: MONTROSE CHEMICAL CORPORATION OF CA -HEN
Site name: MONTROSE CHEM CORP OF CA
Classification: Not a generator, verified

Hazardous Waste Summary:
Waste code: D018
Waste name: BENZENE

Waste code: D019
Waste name: CARBON TETRACHLORIDE

Waste code: D021
Waste name: CHLOROBENZENE

Waste code: D027
Waste name: 1,4-DICHLOROBENZENE

Waste code: U060
Waste name: BENZENE, 1,1'-(2,2-DICHLOROETHYLIDENE)BIS[4-CHLORO-

Waste code: U061
Waste name: BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENE)BIS[4-CHLORO-

Biennial Reports:

Last Biennial Reporting Year: 2009

Annual Waste Handled:
Waste code: D018
Waste name: BENZENE
Amount (Lbs): 455545.6

Waste code: D019
Waste name: CARBON TETRACHLORIDE
Amount (Lbs): 443219.7

Waste code: D021
Waste name: CHLOROBENZENE
Amount (Lbs): 302225.9

Waste code: D022
Waste name: CHLOROFORM
Amount (Lbs): 12325.9

Waste code: D027
Waste name: 1,4-DICHLOROBENZENE
Amount (Lbs): 165645.6

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Waste code: U060
Waste name: BENZENE, 1,1'-(2,2-DICHLOROETHYLIDENE)BIS[4-CHLORO-
Amount (Lbs): 12500

Waste code: U061
Waste name: BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENE)BIS[4-CHLORO-
Amount (Lbs): 12500

Corrective Action Summary:
Event date: 01/01/1984
Event: Stabilization Measures Implemented, Primary measure is exposure control by barrier and/or institutional control (e.g., capping, fencing, deed restrictions).

Event date: 10/12/1987
Event: RFA Completed, Assessment was an RFA.

Event date: 07/01/1988
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

Event date: 01/01/1989
Event: Stabilization Construction Completed

Event date: 02/21/1992
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

Event date: 02/21/1992
Event: Stabilization Measures Evaluation,This facility is not amenable to stabilization activity at the present time for reasons other than 1- it appears to be technically infeasible or inappropriate (NF) or 2- there is a lack of technical information (IN). Reasons for this conclusion may be the status of closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other administrative considerations.

Event date: 01/06/1998
Event: CA074ME

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: TSD IS-Contingency Plan and Emergency Procedures
Date violation determined: 10/31/2007
Date achieved compliance: 11/20/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/06/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Regulation violated: Not reported
Area of violation: TSD IS-Container Use and Management
Date violation determined: 10/26/2006
Date achieved compliance: 01/11/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/15/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.90-94.F
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 04/05/1994
Date achieved compliance: 05/16/1994
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.140-150.H
Area of violation: TSD - Financial Requirements
Date violation determined: 03/29/1985
Date achieved compliance: 10/04/1985
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/04/1985
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 03/22/1985
Date achieved compliance: 02/11/1986
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.140-150.H

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Area of violation: TSD - Financial Requirements
Date violation determined: 10/03/1984
Date achieved compliance: 03/14/1985
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 10/03/1984
Date achieved compliance: 03/14/1985
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 10/03/1984
Date achieved compliance: 03/14/1985
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 12/09/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/22/2008
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/31/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Contingency Plan and Emergency Procedures

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Date achieved compliance: 11/20/2007
Evaluation lead agency: State

Evaluation date: 10/26/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Contingency Plan and Emergency Procedures
Date achieved compliance: 11/20/2007
Evaluation lead agency: State

Evaluation date: 10/26/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Container Use and Management
Date achieved compliance: 01/11/2007
Evaluation lead agency: State

Evaluation date: 04/05/1994
Evaluation: OPERATION AND MAINTENANCE INSPECTION
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 05/16/1994
Evaluation lead agency: State

Evaluation date: 12/06/1990
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/30/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/16/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/11/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/27/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/04/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Evaluation date: 03/29/1985
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 10/04/1985
Evaluation lead agency: EPA

Evaluation date: 03/22/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 02/11/1986
Evaluation lead agency: State

Evaluation date: 03/14/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/03/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 03/14/1985
Evaluation lead agency: State

Evaluation date: 10/03/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - General
Date achieved compliance: 03/14/1985
Evaluation lead agency: State

Evaluation date: 10/03/1984
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: TSD - Closure/Post-Closure
Date achieved compliance: 03/14/1985
Evaluation lead agency: State

CERC-NFRAP:
Site ID: 0902933
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP

CERCLIS-NFRAP Site Contact Name(s):
Contact Title: Not reported
Contact Name: Steven Arbaugh
Contact Tel: Not reported

Contact Title: Not reported
Contact Name: Jim Hanson
Contact Tel: Not reported

Contact Title: Not reported
Contact Name: Jeannie Wong
Contact Tel: (415) 972-3079

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Date Started: Not reported
Date Completed: 09/01/1979
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 05/01/1980
Priority Level: Low priority for further assessment

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 07/01/1988
Priority Level: Low priority for further assessment

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 07/26/1990
Priority Level: NFRAP: No further Remedial Action planned

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 11/02/1992
Priority Level: Not reported

Action: SH
Date Started: Not reported
Date Completed: 11/02/1992
Priority Level: Not reported

Action: ADMIN ORDER ON CONSENT
Date Started: Not reported
Date Completed: Not reported
Priority Level: Not reported

CORRACTS:

EPA ID: NVD008237489
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/1/1984
Action: CA600EC - Stabilization Measures Implemented, Primary measure is exposure control by barrier and/or institutional control
NAICS Code(s): 325199
All Other Basic Organic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD008237489
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/1/1989
Action: CA650 - Stabilization Construction Completed
NAICS Code(s): 325199
All Other Basic Organic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

EPA ID: NVD008237489
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/6/1998
Action: CA074ME
NAICS Code(s): 325199
All Other Basic Organic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD008237489
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 2/21/1992
Action: CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s): 325199
All Other Basic Organic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD008237489
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 2/21/1992
Action: CA225NR - Stabilization Measures Evaluation, This facility is, not amenable to stabilization activity at the, present time for reasons other than (1) it appears to be technically, infeasible or inappropriate (NF) or (2) there is a lack of technical, information (IN). Reasons for this conclusion may be the status of, closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other, administrative considerations
NAICS Code(s): 325199
All Other Basic Organic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD008237489
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 7/1/1988
Action: CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s): 325199
All Other Basic Organic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NVD008237489
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 10/12/1987
Action: CA050RF - RFA Completed, Assessment was an RFA
NAICS Code(s): 325199
All Other Basic Organic Chemical Manufacturing
Original schedule date: 10/12/1987

MONTROSE CHEMICAL CORPORATION OF CA -HEN (Continued) **1000420365**

Schedule end date: Not reported

FINDS:

Registry ID: 110001103056

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

F35 **NEVADA PIC-A-PART , APN 178-12-110-003** **SHWS** **S109273067**
North **110 WEST ROLLY STREET** **N/A**
1/4-1/2 **HENDERSON, NV 89011**
0.314 mi.
1659 ft. **Site 1 of 2 in cluster F**

Relative:
Lower

Actual:
1698 ft.

SHWS:

Facility ID:	H-000702
Date Release Reported to NDEP:	12/12/2007
Program:	non-LUST
NDEP Case Officer:	sharbour
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**10/06/2009**
Regulatory Type of Closure:	Clean w/ Remed
Contaminant:	TPH

---

36 **CIRCLE K STORE NO. 1309 , APN 178-01-810-134** **LUST** **S108855843**
North **1324 NORTH BOULDER HIGHWAY** **N/A**
1/4-1/2 **HENDERSON, NV 89011**
0.315 mi.
1665 ft.

Relative:
Lower

Actual:
1695 ft.

LUST:

Facility ID:	8-000117
Program:	LUST
Type of Media Impacted:	Ground Water
Event:	Not reported
Contaminant:	Gasoline ; Petroleum Hydrocarbons, Perchlorate present in groundwater
Closure Date:	04/03/2007
Closure Type:	NAC 459.9977
Date Reported to NDEP:	12/08/2002
Flag:	CLOSED
NDEP Case Officer:	jdotchin
Location of Paper File:	NDEP: Las Vegas

F37 **HENDERSON ELECTRIC MOTORS** **RCRA-CESQG** **1000188457**
North **1414 ATHOL ST** **FINDS** **NVD981668056**
1/4-1/2 **HENDERSON, NV 89011** **SHWS**
0.328 mi. **UST**
1730 ft. **Site 2 of 2 in cluster F**

Relative:
Lower

Actual:
1696 ft.

RCRA-CESQG:

Date form received by agency:	02/20/1992
Facility name:	HENDERSON ELECTRIC MOTORS
Facility address:	1414 ATHOL ST HENDERSON, NV 89011
EPA ID:	NVD981668056
Contact:	WILLIAM MADAN
Contact address:	1414 ATHOL ST HENDERSON, NV 89011
Contact country:	US
Contact telephone:	(702) 564-5575
Contact email:	Not reported
EPA Region:	09
Land type:	Private
Classification:	Conditionally Exempt Small Quantity Generator
Description:	Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	BRYANT THOMAS
Owner/operator address:	1414 ATHOL ST HENDERSON, NV 89015
Owner/operator country:	Not reported
Owner/operator telephone:	(702) 564-5575
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported
Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

HENDERSON ELECTRIC MOTORS (Continued) **1000188457**

U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Verified to be non-commercial

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 02/04/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 09/16/1996
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

FINDS:

Registry ID: 110004290106

Environmental Interest/Information System
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SHWS:
Facility ID: H-001187
Date Release Reported to NDEP: 04/28/1993
Program: _
NDEP Case Officer: CCHD
Location of Paper File: NDEP: Las Vegas
Type of Media Impacted: Soil
Event: Not reported
Date of Closure: **07/30/1993**
Regulatory Type of Closure: _
Contaminant: _ ; varnish

HENDERSON ELECTRIC MOTORS (Continued) **1000188457**

UST:
Facility ID: 8-001319

Owner:
Owner: HENDERSON ELECTRIC MOTORS
Owner Address: 1414 ATHOL STREET
Owner City,St,Zip: HENDERSON, NV 89015
Owner Phone: (702) 564-5575
Owner Desc: Private

Federally Regulated Tank: TRUE
Tank ID: 1
Tank Status: Permanently Out of Use
Tank Capacity: 240
Tank Substance: Mixture
Tank Material: Asphalt Coated or Bare Steel
Tank: None
Pipe Material: Other
Pipe: None
Install Date: 7/1/1977

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38 **BURKHOLDER JUNIOR HIGH SCHOOL** **SHWS** **S103876085**
South **355 WEST VAN WAGENEN STREET** **N/A**
1/4-1/2 **HENDERSON, NV 89015**
0.338 mi.
1786 ft.

Relative:
Higher

Actual:
1921 ft.

SHWS:
Facility ID: 8-001026
Date Release Reported to NDEP: 01/01/1900
Program: _
NDEP Case Officer: bperkins
Location of Paper File: NDEP: Las Vegas
Type of Media Impacted: Clean Close
Event: Not reported
Date of Closure: **10/16/1990**
Regulatory Type of Closure: Clean Close
Contaminant: _

---

39 **SHELL STATION (FORMER)/JIM HANILY PROP.** **SHWS** **S103877948**
East **65 WEST LAKE MEAD DRIVE** **N/A**
1/4-1/2 **HENDERSON, NV 89015**
0.352 mi.
1859 ft.

Relative:
Higher

Actual:
1887 ft.

SHWS:
Facility ID: H-000495
Date Release Reported to NDEP: 10/10/1994
Program: _
NDEP Case Officer: arushana
Location of Paper File: NDEP: Las Vegas
Type of Media Impacted: Soil & Ground Water
Event: Not reported
Date of Closure: **11/10/1999**
Regulatory Type of Closure: NAC 459.9977
Contaminant: Gasoline ; historical release

40
North
1/4-1/2
0.383 mi.
2024 ft.

IND
400 MAX CT.
HENDERSON, NV

SWRCY **S109844383**
N/A

Relative:
Lower

Actual:
1689 ft.

NV SWRCY:

Facility Type:	Not reported
Phone:	702-477-7187
Provide Pick-up:	Not reported
Aluminum:	Not reported
Batteries/Household:	Not reported
Cardboard:	Not reported
Carpet Padding:	Not reported
Cell Phones:	Not reported
Computers:	Not reported
Computer Disks:	Not reported
Cooking Oil/Grease:	Not reported
Flourescent Lamps:	Not reported
Food/Yard Waste:	Not reported
Glass Containers:	Not reported
Laser/Ink Jet Cartridges:	Not reported
Magazines:	Not reported
Mattresses:	Not reported
Newspaper:	Not reported
Paint:	Not reported
Pallets:	X
Paper-Mixed:	Not reported
Paper Shredding:	Not reported
Plastic:	Not reported
Scrap Metal:	Not reported
Shink Wrap:	Not reported
Telephone Books:	Not reported
Wood:	Not reported
Comments:	Not reported
Additional Notes:	Not reported

41
North
1/4-1/2
0.433 mi.
2285 ft.

SOUTHERN OASIS CONSTRUCTION
1548 ATHOL STREET
HENDERSON, NV 89015

SHWS **S103875793**
N/A

Relative:
Lower

Actual:
1683 ft.

SHWS:

Facility ID:	8-000089
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**01/11/1996**
Regulatory Type of Closure:	_
Contaminant:	_

G42 **TEXACO STATION #0675** **SHWS** **S103875984**
East **3 EAST LAKE MEAD DRIVE** **N/A**
1/4-1/2 **HENDERSON, NV 89015**
0.445 mi.
2352 ft. **Site 1 of 2 in cluster G**

Relative:
Higher

Actual:
1890 ft.

SHWS:

Facility ID:	8-000682
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**11/28/1995**
Regulatory Type of Closure:	_
Contaminant:	_

G43 **VERNS TEXACO** **SHWS** **S105114682**
East **3 EAST LAKE MEAD DRIVE** **N/A**
1/4-1/2 **HENDERSON, NV**
0.445 mi.
2352 ft. **Site 2 of 2 in cluster G**

Relative:
Higher

Actual:
1890 ft.

SHWS:

Facility ID:	8-001824
Date Release Reported to NDEP:	07/06/2001
Program:	_
NDEP Case Officer:	spiper
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**08/03/2001**
Regulatory Type of Closure:	Clean w/ Remed
Contaminant:	Gasoline

---

44 **CIRCLE K CORPORATION #1366** **LUST** **S103875804**
ENE **450 NORTH WATER STREET** **N/A**
1/4-1/2 **HENDERSON, NV 89015**
0.451 mi.
2380 ft.

Relative:
Higher

Actual:
1804 ft.

LUST:

Facility ID:	8-000121
Program:	LUST
Type of Media Impacted:	Soil & Ground Water
Event:	Not reported
Contaminant:	Gasoline
Closure Date:	04/20/2007
Closure Type:	Other
Date Reported to NDEP:	01/01/1990
Flag:	CLOSED
NDEP Case Officer:	spiper
Location of Paper File:	NDEP: Las Vegas

45
South
1/4-1/2
0.470 mi.
2481 ft.

BURKHOLDER PARK — **SHWS** — **S104535034**
645 WEST VICTORY ROAD — **N/A**
HENDERSON, NV 89015

Relative:
Higher

Actual:
1947 ft.

SHWS:

Facility ID:	H-000062
Date Release Reported to NDEP:	06/21/2000
Program:	_
NDEP Case Officer:	bpohlman
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**09/08/2000**
Regulatory Type of Closure:	Clean w/ Remed
Contaminant:	Gasoline

H46
South
1/4-1/2
0.486 mi.
2566 ft.

CHEMSTAR LIME COMPANY OF NEVADA — **SHWS** — **S103875841**
BMI COMPLEX — **N/A**
HENDERSON, NV

Site 1 of 4 in cluster H

Relative:
Higher

Actual:
1936 ft.

SHWS:

Facility ID:	8-000210
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**08/09/1993**
Regulatory Type of Closure:	_
Contaminant:	_

H47
South
1/4-1/2
0.486 mi.
2566 ft.

STAUFFER/PIONEER CHLOR-ALKALI , FORMER BULK TRANSP — **SHWS** — **S103876971**
BMI COMPLEX — **N/A**
HENDERSON, NV 89015

Site 2 of 4 in cluster H

Relative:
Higher

Actual:
1936 ft.

SHWS:

Facility ID:	H-000536
Date Release Reported to NDEP:	03/05/2009
Program:	non-LUST
NDEP Case Officer:	jdotchin
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**04/15/2009**
Regulatory Type of Closure:	Clean w/ Remed
Contaminant:	Diesel ; Bulk Transportation diesel fuel dispenser release (Historic). Bulk Transportation was required by Olin Corporation to remediate this area.
Facility ID:	H-000536
Date Release Reported to NDEP:	04/20/1999

STAUFFER/PIONEER CHLOR-ALKALI , FORMER BULK TRANSP (Continued) **S103876971**

Program:	_
NDEP Case Officer:	mskorska
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**10/27/1999**
Regulatory Type of Closure:	Clean w/ Remed
Contaminant:	Other ; Sodium Hydroxide - 3260 Lbs

Facility ID:	H-000536
Date Release Reported to NDEP:	04/25/1991
Program:	non-LUST
NDEP Case Officer:	mskorska
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil & Ground Water
Event:	Confirmed Release
Date of Closure:	**Not reported**
Regulatory Type of Closure:	Not reported
Contaminant:	Other ; BHC isomers, VOCs, chlorinated benzenes

H48 **CHEMSTAR, INC.** **SHWS** **S103876973**
South **BMI COMPLEX** **N/A**
1/4-1/2 **HENDERSON, NV 89015**
0.486 mi.
2566 ft. **Site 3 of 4 in cluster H**

Relative: **Higher**

Actual: **1936 ft.**

SHWS:

Facility ID:	H-000538
Date Release Reported to NDEP:	04/25/1991
Program:	_
NDEP Case Officer:	jcarr
Location of Paper File:	NDEP: Carson City
Type of Media Impacted:	Soil & Ground Water
Event:	Not reported
Date of Closure:	**01/31/1995**
Regulatory Type of Closure:	_
Contaminant:	TPH ; TPH, Caustics

H49 **MONTROSE CHEMICAL COMPANY** **SHWS** **S103876975**
South **BMI COMPLEX** **N/A**
1/4-1/2 **HENDERSON, NV 89015**
0.486 mi.
2566 ft. **Site 4 of 4 in cluster H**

Relative: **Higher**

Actual: **1936 ft.**

SHWS:

Facility ID:	H-000540
Date Release Reported to NDEP:	04/25/1991
Program:	non-LUST
NDEP Case Officer:	mskorska
Location of Paper File:	NDEP: Carson City
Type of Media Impacted:	Soil & Ground Water
Event:	Confirmed Release
Date of Closure:	**Not reported**
Regulatory Type of Closure:	Not reported
Contaminant:	Other ; chlorinated benzenes, pesticides (DDT, DDE, DDD)

50
ENE
1/4-1/2
0.487 mi.
2572 ft.

K-MART STORE #9554
498 BOULDER HIGHWAY
HENDERSON, NV 89015

SHWS **S103875870**
N/A

Relative:
Lower

Actual:
1796 ft.

SHWS:

Facility ID:	8-000267
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**11/17/1992**
Regulatory Type of Closure:	_
Contaminant:	_

51
ESE
1/2-1
0.594 mi.
3135 ft.

ALLEYWAY
38 WATER STREET
HENDERSON, NV

SHWS **S103877298**
N/A

Relative:
Higher

Actual:
1918 ft.

SHWS:

Facility ID:	H-001309
Date Release Reported to NDEP:	07/21/1998
Program:	_
NDEP Case Officer:	arushana
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**07/30/1998**
Regulatory Type of Closure:	Other
Contaminant:	Diesel ; 50 gal. from saddle tank; removed from asphalt

---

52
North
1/2-1
0.650 mi.
3432 ft.

CREDIT AUTO SALES
1700 NORTH BOULDER HIGHWAY
LAS VEGAS, NV 89015

SHWS **S103876942**
N/A

Relative:
Lower

Actual:
1667 ft.

SHWS:

Facility ID:	H-000491
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	_
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**09/27/1991**
Regulatory Type of Closure:	_
Contaminant:	_

I53 **LAKE MEAD CHEVRON FOOD MART** **SHWS** **S106514251**
East **101 EAST LAKE MEAD DRIVE** **N/A**
1/2-1 **HENDERSON, NV**
0.653 mi.
3450 ft. **Site 1 of 2 in cluster I**

Relative:
Higher

Actual:
1877 ft.

SHWS:

Facility ID:	8-001690
Date Release Reported to NDEP:	11/21/2003
Program:	non-LUST
NDEP Case Officer:	spiper
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil & Ground Water
Event:	Not reported
Date of Closure:	**03/26/2004**
Regulatory Type of Closure:	Clean Close
Contaminant:	Motor Oil ; diesel fuel to soil

I54 **ST. ROSE DOMINICAN HOSPITAL** **SHWS** **S103875969**
East **102 LAKE MEAD DRIVE** **N/A**
1/2-1 **HENDERSON, NV 89015**
0.662 mi.
3493 ft. **Site 2 of 2 in cluster I**

Relative:
Higher

Actual:
1873 ft.

SHWS:

Facility ID:	8-000568
Date Release Reported to NDEP:	01/01/1900
Program:	_
NDEP Case Officer:	fstanio
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Clean Close
Event:	Not reported
Date of Closure:	**01/05/1991**
Regulatory Type of Closure:	Clean Close
Contaminant:	_

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55 **CHEVRON #94668** **SHWS** **S103875797**
ENE **100 NORTH BOULDER HIGHWAY** **N/A**
1/2-1 **HENDERSON, NV 89015**
0.678 mi.
3582 ft.

Relative:
Higher

Actual:
1845 ft.

SHWS:

Facility ID:	8-000106
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**12/05/1991**
Regulatory Type of Closure:	_
Contaminant:	_

56
ESE
1/2-1
0.685 mi.
3617 ft.

SPRINT CENTRAL TELEPHONE
104 WATER STREET
HENDERSON, NV 89015

Database(s): **SHWS**
EDR ID Number: **S103875779**
EPA ID Number: **N/A**

Relative:
Higher

Actual:
1931 ft.

SHWS:

Facility ID:	8-000075
Date Release Reported to NDEP:	01/01/1900
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**02/11/1997**
Regulatory Type of Closure:	_
Contaminant:	_

J57
NNW
1/2-1
0.800 mi.
4226 ft.

EDGAR MILLOWAY PROPERTY
308 WEST FOSTER
HENDERSON, NV

Site 1 of 2 in cluster J

Database(s): **SHWS**
EDR ID Number: **S103877256**
EPA ID Number: **N/A**

Relative:
Lower

Actual:
1667 ft.

SHWS:

Facility ID:	H-001263
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	lertler
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**02/05/1998**
Regulatory Type of Closure:	NAC 445A A-K
Contaminant:	Motor Oil

58
ENE
1/2-1
0.802 mi.
4232 ft.

7-ELEVEN #13696 - CLOSED
120 E LAKE MEAD DR
HENDERSON, NV 89015

Database(s): **SHWS**, **UST**
EDR ID Number: **U003380029**
EPA ID Number: **N/A**

Relative:
Higher

Actual:
1859 ft.

SHWS:

Facility ID:	8-000584
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	CCHD: Las Vegas
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**04/08/1997**
Regulatory Type of Closure:	_
Contaminant:	_

UST:

Facility ID:	8-000584

Owner:

7-ELEVEN #13696 - CLOSED (Continued) **U003380029**

Owner:	7-ELEVEN INC
Owner Address:	ATTN: GASOLINE ACCOUNTING PO BOX 711
Owner City,St,Zip:	DALLAS, TX 75221
Owner Phone:	(702) 270-7123
Owner Desc:	Commercial
Federally Regulated Tank:	TRUE
Tank ID:	1
Tank Status:	Permanently Out of Use
Tank Capacity:	10000
Tank Substance:	Gasoline
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Unknown
Pipe:	None
Install Date:	Not reported
Federally Regulated Tank:	TRUE
Tank ID:	2
Tank Status:	Permanently Out of Use
Tank Capacity:	10000
Tank Substance:	Gasoline
Tank Material:	Asphalt Coated or Bare Steel
Tank:	None
Pipe Material:	Unknown
Pipe:	None
Install Date:	Not reported

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59 **UNOCAL SS #5747** **SHWS** **S104178998**
East **100 SOUTH BOULDER HIGHWAY** **N/A**
1/2-1 **HENDERSON, NV 89015**
0.802 mi.
4236 ft.

Relative:
Higher

Actual:
1881 ft.

SHWS:

Facility ID:	8-000737
Date Release Reported to NDEP:	06/17/1996
Program:	_
NDEP Case Officer:	tcroft
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**10/24/2001**
Regulatory Type of Closure:	Clean Close
Contaminant:	_

J60 **C & P ENTERPRISES** **SHWS** **S103876990**
NNW **321 FOSTER AVENUE** **N/A**
1/2-1 **HENDERSON, NV**
0.805 mi.
4252 ft. **Site 2 of 2 in cluster J**

Relative:
Lower

Actual:
1667 ft.

SHWS:

Facility ID:	H-000592
Date Release Reported to NDEP:	05/21/1992
Program:	_

C & P ENTERPRISES (Continued) **S103876990**

NDEP Case Officer:	abiaggi
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**09/09/1992**
Regulatory Type of Closure:	Clean w/ Remed
Contaminant:	TPH

61
WNW
1/2-1
0.831 mi.
4386 ft.

MONIER LIFE TILE **SHWS** **S103877714**
430 EASTGATE ROAD **N/A**
HENDERSON, NV 89014

Relative:
Lower

Actual:
1703 ft.

SHWS:

Facility ID:	8-001658
Date Release Reported to NDEP:	05/08/1998
Program:	_
NDEP Case Officer:	arushana
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**08/05/1998**
Regulatory Type of Closure:	NAC 459 A-K
Contaminant:	Diesel ; old spill before tank contents switched to veg oil

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62
WNW
1/2-1
0.865 mi.
4565 ft.

BONANZA MATERIALS **SHWS** **S103876126**
450 EASTGATE ROAD **N/A**
HENDERSON, NV 89015

Relative:
Lower

Actual:
1699 ft.

SHWS:

Facility ID:	8-001160
Date Release Reported to NDEP:	_
Program:	_
NDEP Case Officer:	CCHD
Location of Paper File:	_
Type of Media Impacted:	_
Event:	Not reported
Date of Closure:	**08/29/1991**
Regulatory Type of Closure:	_
Contaminant:	_

63
ESE
1/2-1
0.885 mi.
4672 ft.

CITY OF HENDERSON - POLICE DEPT. **SHWS** **S103875888**
243 SOUTH WATER STREET **N/A**
HENDERSON, NV 89015

Relative:
Higher

Actual:
1964 ft.

SHWS:

Facility ID:	8-000316
Date Release Reported to NDEP:	01/01/1900
Program:	_
NDEP Case Officer:	CCHD

CITY OF HENDERSON - POLICE DEPT. (Continued) **S103875888**

Location of Paper File: CCHD: Las Vegas
Type of Media Impacted: _
Event: Not reported
Date of Closure: 09/12/1991
Regulatory Type of Closure: _
Contaminant: _

64
East
1/2-1
0.918 mi.
4846 ft.

DEPT. OF PUBLIC WORKS/CITY OF HENDERSON **SHWS** **S103876910**
214 SOUTH BOULDER HIGHWAY **N/A**
HENDERSON, NV 89015

Relative:
Higher

Actual:
1897 ft.

SHWS:
Facility ID: H-000455
Date Release Reported to NDEP: 01/01/1900
Program: _
NDEP Case Officer: CCHD
Location of Paper File: NDEP: Las Vegas
Type of Media Impacted: _
Event: Not reported
Date of Closure: 04/11/1996
Regulatory Type of Closure: Clean Close
Contaminant: _

K65
NW
1/2-1
0.934 mi.
4933 ft.

BASIC READY MIX **SHWS** **S103876138**
513 EASTGATE ROAD **N/A**
HENDERSON, NV 89015

Site 1 of 2 in cluster K

Relative:
Lower

Actual:
1695 ft.

SHWS:
Facility ID: 8-001311
Date Release Reported to NDEP: _
Program: _
NDEP Case Officer: CCHD
Location of Paper File: _
Type of Media Impacted: _
Event: Not reported
Date of Closure: 06/25/1993
Regulatory Type of Closure: _
Contaminant: _

K66
NW
1/2-1
0.938 mi.
4955 ft.

RAYMOND LAND, LLC , APN 178-02-302-008 **SHWS** **S104395315**
513 EASTGATE ROAD **N/A**
HENDERSON, NV 89011

Site 2 of 2 in cluster K

Relative:
Lower

Actual:
1695 ft.

SHWS:
Facility ID: H-000737
Date Release Reported to NDEP: 02/23/2009
Program: Mobile Source
NDEP Case Officer: sfischen
Location of Paper File: NDEP: Carson City

RAYMOND LAND, LLC , APN 178-02-302-008 (Continued) **S104395315**

Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**04/22/2009**
Regulatory Type of Closure:	Other
Contaminant:	Diesel
Facility ID:	8-001498
Date Release Reported to NDEP:	03/20/2000
Program:	_
NDEP Case Officer:	dlloyd
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	None
Event:	Not reported
Date of Closure:	**09/21/2000**
Regulatory Type of Closure:	NAC 445A A-K
Contaminant:	Diesel ; 250-gal diesel released to secondary containment

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67
NW
1/2-1
0.960 mi.
5070 ft.

INDEPENDENT LANDSCAPE SERVICES, L.L.C. , WARM SPRI **SHWS** **S108437352**
647 CAPE HORN DRIVE **N/A**
HENDERSON, NV 89011

Relative:
Lower

Actual:
1701 ft.

SHWS:

Facility ID:	H-000553
Date Release Reported to NDEP:	05/26/2005
Program:	Mobile Source
NDEP Case Officer:	ljohnson
Location of Paper File:	NDEP: Las Vegas
Type of Media Impacted:	Soil
Event:	Not reported
Date of Closure:	**07/13/2007**
Regulatory Type of Closure:	NAC 445A A-K
Contaminant:	Diesel

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HENDERSON	1000323589	EBONY CONSTRUCTION	LAKE MEAD DR	89015	FINDS,RCRA-NLR
HENDERSON	1000402984	USDOE WAPA AMARGOSA SUBSTATION	MAJOR AVENUE AND VAN WAGEN STR	89015	FINDS,RCRA-CESQG
HENDERSON	1000707641	HENDERSON LEAD CONTAMINATION SOIL	T21S, R63E, SEC 26,27,34,35 -	89015	CERCLIS,FINDS
HENDERSON	1007111827	FIESTA PARK HOME DEVELOPMENT SITE	SE CORNER US 95 AND LAKE MEAD	89015	RCRA-NLR
HENDERSON	1014200997	TRONOX LLC - HENDERSON, NV	8000 WEST LAKE MEAD PKWY	89015	TSCA
HENDERSON	S103876947	BONANZA MATERIALS	5775 WINDMILL LANE		HWS
HENDERSON	S103876950	U.S. BUREAU OF RECLAMATION	LAKE LAS VEGAS PARKWAY		HWS
HENDERSON	S103876988	BLM LAKE LAS VEGAS	5 MILES EAST OF HENDERSON		HWS
HENDERSON	S103877055	WESTERN AREA POWER ADMINISTRATION	BASIC SUBSTATION (BMI COMPLEX)	89015	HWS
HENDERSON	S103877056	WARM SPRINGS BUSINESS PARK (PROPOS	BETWEEN CAPE HORN / WARM SPRIN		HWS
HENDERSON	S103877183	ATLAS, INC.	BOULDER HIGHWAY		HWS
HENDERSON	S103878003	SKY HARBOR AIRPORT	500 EAST NEVADA HIGHWAY		HWS
HENDERSON	S106514480	BOULDER HIGHWAY DIESEL SPILL	BOULDER HIGHWAY @ WAGON WHEEL		HWS
HENDERSON	S106878336	THE WINROC CORPORATION MOBILE SOUR	BLUE DIAMOND ROAD @ QUARTER HO		HWS
HENDERSON	S108250002	AMERICAN ASPHALT & GRADING COMPANY	U.S. HIGHWAY 95 @ WAGONWHEEL D		HWS
HENDERSON	S108250157	INFRASOURCE POWER MOBILE SOURCE ,	U.S. HIGHWAY 95 @ WAGONWHEEL D		HWS
HENDERSON	S108250241	NEVADA DEPARTMENT OF TRANSPORTATIO	U.S. HIGHWAY 95 @ WAGONWHEEL D		HWS
HENDERSON	S108250328	SILVER STATE DISPOSAL	STATE ROUTE 146 WEST OF GOLDA		HWS
HENDERSON	S110115062	LEVY REALTY TRUST , FIESTA PROPERT	U.S. HIGHWAY 95 @ LAKE MEAD BO		HWS
HENDERSON	S110335826	U.S. XPRESS ENTERPRISES MOBILE SOU	U.S. HIGHWAY 95 @ INTERSTATE 2		HWS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 07/02/2010
Date Data Arrived at EDR: 07/14/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 82

Source: EPA
Telephone: N/A
Last EDR Contact: 10/13/2010
Next Scheduled EDR Contact: 01/24/2011
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 07/02/2010
Date Data Arrived at EDR: 07/14/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 82

Source: EPA
Telephone: N/A
Last EDR Contact: 10/13/2010
Next Scheduled EDR Contact: 01/24/2011
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 11/22/2010
Next Scheduled EDR Contact: 02/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 07/02/2010
Date Data Arrived at EDR: 07/14/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 82

Source: EPA
Telephone: N/A
Last EDR Contact: 10/13/2010
Next Scheduled EDR Contact: 01/24/2011
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 01/29/2010
Date Data Arrived at EDR: 02/09/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 10/01/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 06/23/2009
Date Data Arrived at EDR: 01/15/2010
Date Made Active in Reports: 02/10/2010
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 10/13/2010
Next Scheduled EDR Contact: 01/24/2011
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 06/23/2009
Date Data Arrived at EDR: 09/02/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 19

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 12/01/2010
Next Scheduled EDR Contact: 03/14/2011
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 05/25/2010
Date Data Arrived at EDR: 06/02/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 124

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 11/22/2010
Next Scheduled EDR Contact: 02/28/2011
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/07/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/07/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/07/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/07/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 12/20/2009
Date Data Arrived at EDR: 01/20/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/13/2010
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 12/20/2009
Date Data Arrived at EDR: 01/20/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/13/2010
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 07/09/2010
Date Data Arrived at EDR: 07/09/2010
Date Made Active in Reports: 08/17/2010
Number of Days to Update: 39

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 10/06/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: Sites Database

A listing of correction action sites.

Date of Government Version: 07/08/2010
Date Data Arrived at EDR: 09/30/2010
Date Made Active in Reports: 10/29/2010
Number of Days to Update: 29

Source: Department of Conservation and Natural Resources
Telephone: 775-687-5872
Last EDR Contact: 11/23/2010
Next Scheduled EDR Contact: 03/07/2011
Data Release Frequency: Varies

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Landfill List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/08/2010
Date Data Arrived at EDR: 09/09/2010
Date Made Active in Reports: 10/29/2010
Number of Days to Update: 50

Source: Department of Conservation and Natural Resources
Telephone: 775-687-5872
Last EDR Contact: 09/09/2010
Next Scheduled EDR Contact: 12/20/2010
Data Release Frequency: Annually

State and tribal leaking storage tank lists

LUST: Sites Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 07/08/2010
Date Data Arrived at EDR: 09/30/2010
Date Made Active in Reports: 10/29/2010
Number of Days to Update: 29

Source: Department of Conservation and Natural Resources
Telephone: 775-687-5872
Last EDR Contact: 11/23/2010
Next Scheduled EDR Contact: 03/07/2011
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 08/30/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 08/27/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 08/05/2010
Date Data Arrived at EDR: 08/06/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 59

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/19/2009
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 25

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 11/02/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 08/05/2010
Date Data Arrived at EDR: 08/06/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 59

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009
Date Data Arrived at EDR: 05/04/2010
Date Made Active in Reports: 07/07/2010
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 12/03/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/24/2010
Date Data Arrived at EDR: 05/27/2010
Date Made Active in Reports: 08/09/2010
Number of Days to Update: 74

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank List

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 07/08/2010
Date Data Arrived at EDR: 09/30/2010
Date Made Active in Reports: 10/29/2010
Number of Days to Update: 29

Source: Department of Conservation and Natural Resources
Telephone: 775-687-5872
Last EDR Contact: 09/30/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Varies

AST: Aboveground Storage Tank List

Registered Aboveground Storage Tanks.

Date of Government Version: 01/10/2000
Date Data Arrived at EDR: 01/11/2000
Date Made Active in Reports: 02/16/2000
Number of Days to Update: 36

Source: Department of Conservation and Natural Resources
Telephone: 775-687-5872
Last EDR Contact: 09/27/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2008
Date Data Arrived at EDR: 12/30/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 76

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 11/09/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 08/05/2010
Date Data Arrived at EDR: 08/06/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 59

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Quarterly

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 08/27/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Semi-Annually

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/24/2010
Date Data Arrived at EDR: 05/27/2010
Date Made Active in Reports: 08/09/2010
Number of Days to Update: 74

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 08/30/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/19/2009
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 25

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 11/02/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 02/11/2010
Date Data Arrived at EDR: 02/11/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 60

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 08/03/2010
Date Data Arrived at EDR: 08/04/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 61

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Semi-Annually

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 10/29/2010
Next Scheduled EDR Contact: 01/31/2011
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: Voluntary Cleanup Program Sites

The Voluntary Cleanup Program provides relief from liability to owners who undertake cleanups of contaminated properties under the oversight of the Nevada Division of Environmental Protection.

Date of Government Version: 03/31/2010
Date Data Arrived at EDR: 07/08/2010
Date Made Active in Reports: 07/28/2010
Number of Days to Update: 20

Source: Department of Conservation & Natural Resources
Telephone: 775-687-9381
Last EDR Contact: 10/17/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 04/02/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 10/04/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Project Tracking Database

Brownfields sites included in the Project Tracking Database. The term "brownfields" is used to describe abandoned, idled, or underused industrial or commercial properties taken out of productive use because of real or perceived risks from environmental contamination. The State of Nevada has initiated Brownfields, a land-recycling program, to provide an opportunity to redevelop these undesirable properties and revitalize communities.

Date of Government Version: 07/08/2010
Date Data Arrived at EDR: 09/30/2010
Date Made Active in Reports: 10/29/2010
Number of Days to Update: 29

Source: Division of Environmental Protection
Telephone: 775-687-9384
Last EDR Contact: 11/23/2010
Next Scheduled EDR Contact: 03/07/2011
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 06/24/2010
Date Data Arrived at EDR: 06/25/2010
Date Made Active in Reports: 08/17/2010
Number of Days to Update: 53
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/29/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 11/09/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Varies

SWRCY: Recycling Information Listing

A listing of recycling facilities in Nevada.

Date of Government Version: 03/04/2010
Date Data Arrived at EDR: 05/27/2010
Date Made Active in Reports: 07/14/2010
Number of Days to Update: 48
Source: Department of Environmental Protection
Telephone: 775-687-9463
Last EDR Contact: 11/23/2010
Next Scheduled EDR Contact: 03/07/2011
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 11/09/2010
Next Scheduled EDR Contact: 02/21/2011
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 05/07/2010
Date Data Arrived at EDR: 06/18/2010
Date Made Active in Reports: 08/17/2010
Number of Days to Update: 60

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 10/29/2010
Next Scheduled EDR Contact: 12/20/2010
Data Release Frequency: Quarterly

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 05/06/2010
Date Data Arrived at EDR: 05/11/2010
Date Made Active in Reports: 08/09/2010
Number of Days to Update: 90

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/22/2010
Next Scheduled EDR Contact: 03/07/2011
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 04/06/2010
Date Data Arrived at EDR: 04/07/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 50

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 10/07/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/07/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2010
Date Data Arrived at EDR: 02/09/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 62

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 11/09/2010
Next Scheduled EDR Contact: 02/21/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 10/28/2010
Next Scheduled EDR Contact: 01/31/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 09/14/2010
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 07/01/2010
Date Data Arrived at EDR: 08/11/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 113

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 10/04/2010
Next Scheduled EDR Contact: 01/17/2011
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 06/01/2010
Date Data Arrived at EDR: 06/16/2010
Date Made Active in Reports: 08/17/2010
Number of Days to Update: 62

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/15/2010
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 12/14/2009
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 5

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/29/2010
Next Scheduled EDR Contact: 03/14/2011
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/09/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 84

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 09/09/2010
Next Scheduled EDR Contact: 12/20/2010
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 01/13/2010
Date Made Active in Reports: 02/18/2010
Number of Days to Update: 36

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 09/01/2010
Next Scheduled EDR Contact: 12/13/2010
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 10/01/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 11/29/2010
Next Scheduled EDR Contact: 03/14/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 11/29/2010
Next Scheduled EDR Contact: 03/14/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 01/06/2010
Date Made Active in Reports: 02/10/2010
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 11/01/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 04/24/2010
Date Data Arrived at EDR: 04/29/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 18

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 09/27/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 02/01/2010
Date Data Arrived at EDR: 04/22/2010
Date Made Active in Reports: 08/09/2010
Number of Days to Update: 109

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 11/10/2010
Next Scheduled EDR Contact: 01/31/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 09/13/2010
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/13/2010
Date Data Arrived at EDR: 07/14/2010
Date Made Active in Reports: 08/09/2010
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 10/14/2010
Next Scheduled EDR Contact: 01/24/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 09/15/2010
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 02/25/2010
Date Made Active in Reports: 05/12/2010
Number of Days to Update: 76

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 11/30/2010
Next Scheduled EDR Contact: 03/07/2011
Data Release Frequency: Biennially

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NPDES: Permitted Facility Listing
A listing of permitted wastewater facilities.

Date of Government Version: 01/04/2010
Date Data Arrived at EDR: 01/22/2010
Date Made Active in Reports: 01/28/2010
Number of Days to Update: 6

Source: Department of Environmental Protection
Telephone: 775-687-9414
Last EDR Contact: 09/27/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Varies

AIRS: Permitted Airs Facility Listing
A listing of permitted Airs facilities and their associated emissions information.

Date of Government Version: 08/29/2006
Date Data Arrived at EDR: 08/31/2006
Date Made Active in Reports: 10/10/2006
Number of Days to Update: 40

Source: Division of Environmental Protection
Telephone: 775-687-9359
Last EDR Contact: 09/27/2010
Next Scheduled EDR Contact: 01/10/2011
Data Release Frequency: Varies

HMRI: Hazardous Materials Repository Information Data
Emergency Planning and Community Right-to-Know Act (EPCRA) required facilities which store or manufacture hazardous materials to prepare and submit a chemical inventory report by March 1st of each year to the State Emergency Response Commission (SERC), LEPC and the local fire department. The inventory form must include information on all hazardous chemicals present at the facility during the previous calendar year in amounts that meet or exceed thresholds.

Date of Government Version: 08/05/2008
Date Data Arrived at EDR: 08/05/2008
Date Made Active in Reports: 08/13/2008
Number of Days to Update: 8

Source: State Emergency Response Commission
Telephone: 775-687-6973
Last EDR Contact: 09/20/2010
Next Scheduled EDR Contact: 01/03/2011
Data Release Frequency: Semi-Annually

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 10/28/2010
Next Scheduled EDR Contact: 01/31/2011
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 08/31/2010
Date Data Arrived at EDR: 09/01/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/29/2010
Next Scheduled EDR Contact: 02/07/2011
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 10/28/2010
Next Scheduled EDR Contact: 01/31/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 11/09/2009
Date Data Arrived at EDR: 12/18/2009
Date Made Active in Reports: 02/10/2010
Number of Days to Update: 54
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 09/15/2010
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 11/10/2010
Next Scheduled EDR Contact: 02/14/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339
Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/28/2010
Next Scheduled EDR Contact: 01/31/2011
Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Historical Auto Stations: EDR Proprietary Historic Gas Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Historical Cleaners: EDR Proprietary Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

WASHOE COUNTY:

Underground Storage Tank in Washoe County

A listing of underground storage tank sites located in Washoe County.

Date of Government Version: 09/27/2010
Date Data Arrived at EDR: 09/28/2010
Date Made Active in Reports: 10/29/2010
Number of Days to Update: 31

Source: Washoe County Department of Environmental Health
Telephone: 775-328-2493
Last EDR Contact: 12/06/2010
Next Scheduled EDR Contact: 03/21/2011
Data Release Frequency: Quarterly

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/11/2009
Number of Days to Update: 16

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 12/01/2010
Next Scheduled EDR Contact: 03/07/2011
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 07/28/2010
Date Data Arrived at EDR: 08/11/2010
Date Made Active in Reports: 09/24/2010
Number of Days to Update: 44

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 11/09/2010
Next Scheduled EDR Contact: 02/21/2011
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data

Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Facility List
Source: Department of Human Resources
Telephone: 775-684-1100

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

TRONOX
560 W LAKE MEAD PARKWAY
HENDERSON, NV 89015

TARGET PROPERTY COORDINATES

Latitude (North):	36.04450 - 36° 2' 40.2''
Longitude (West):	115.0013 - 115° 0' 4.7''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	680052.4
UTM Y (Meters):	3990532.0
Elevation:	1800 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	36115-A1 LAS VEGAS SE, NV
Most Recent Revision:	1984
East Map:	36114-A8 HENDERSON, NV
Most Recent Revision:	1983

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

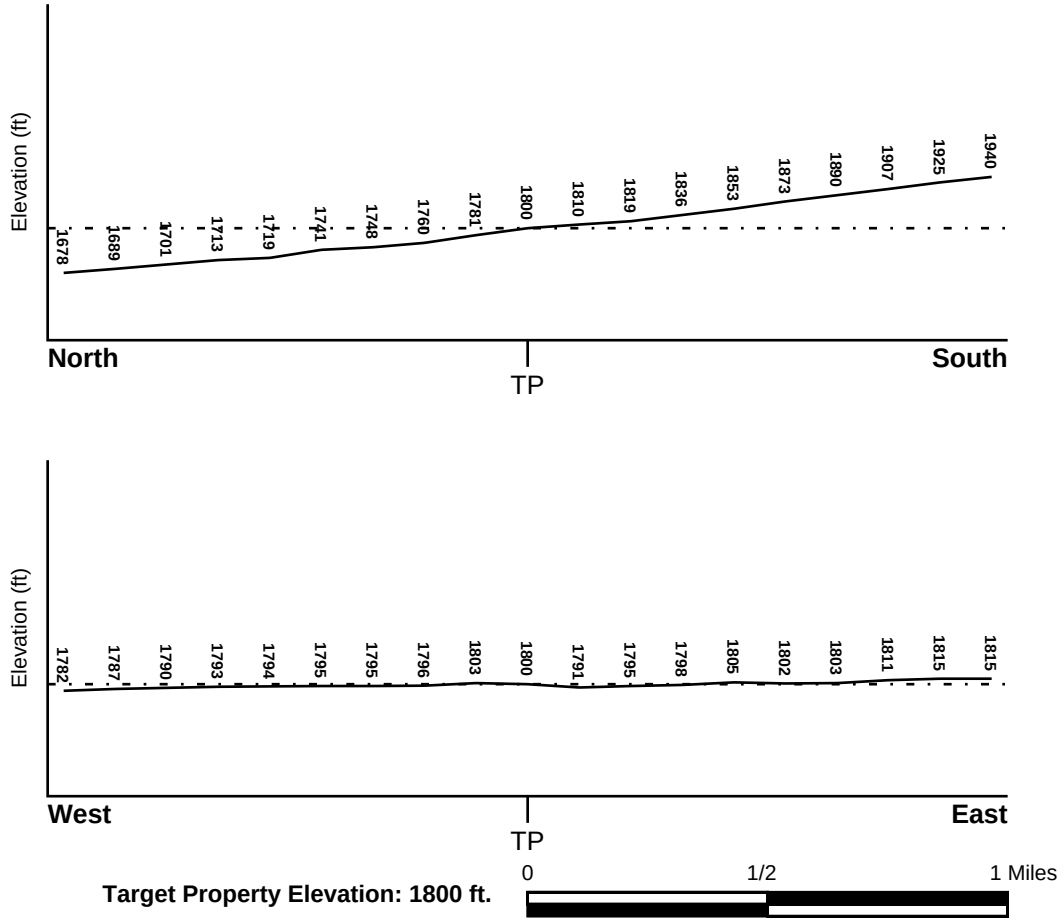
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General North

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
CLARK, NV	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 32003C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
LAS VEGAS SE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Location Relative to TP:	1 - 2 Miles ESE
Site Name:	HENDERSON LANDFILL
Site EPA ID Number:	NV1141190024
Groundwater Flow Direction:	INTO THE WASH.
Measured Depth to Water:	not available.
Hydraulic Connection:	Detailed hydraulic connection information is not available. Historical recharge of the near-surface aquifer was via leakage from deeper artesian aquifers, but discharge to the near-surface aquifer from surface infiltration has increased.
Sole Source Aquifer:	No information about a sole source aquifer is available
Data Quality:	Information is inferred in the CERCLIS investigation report(s)

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

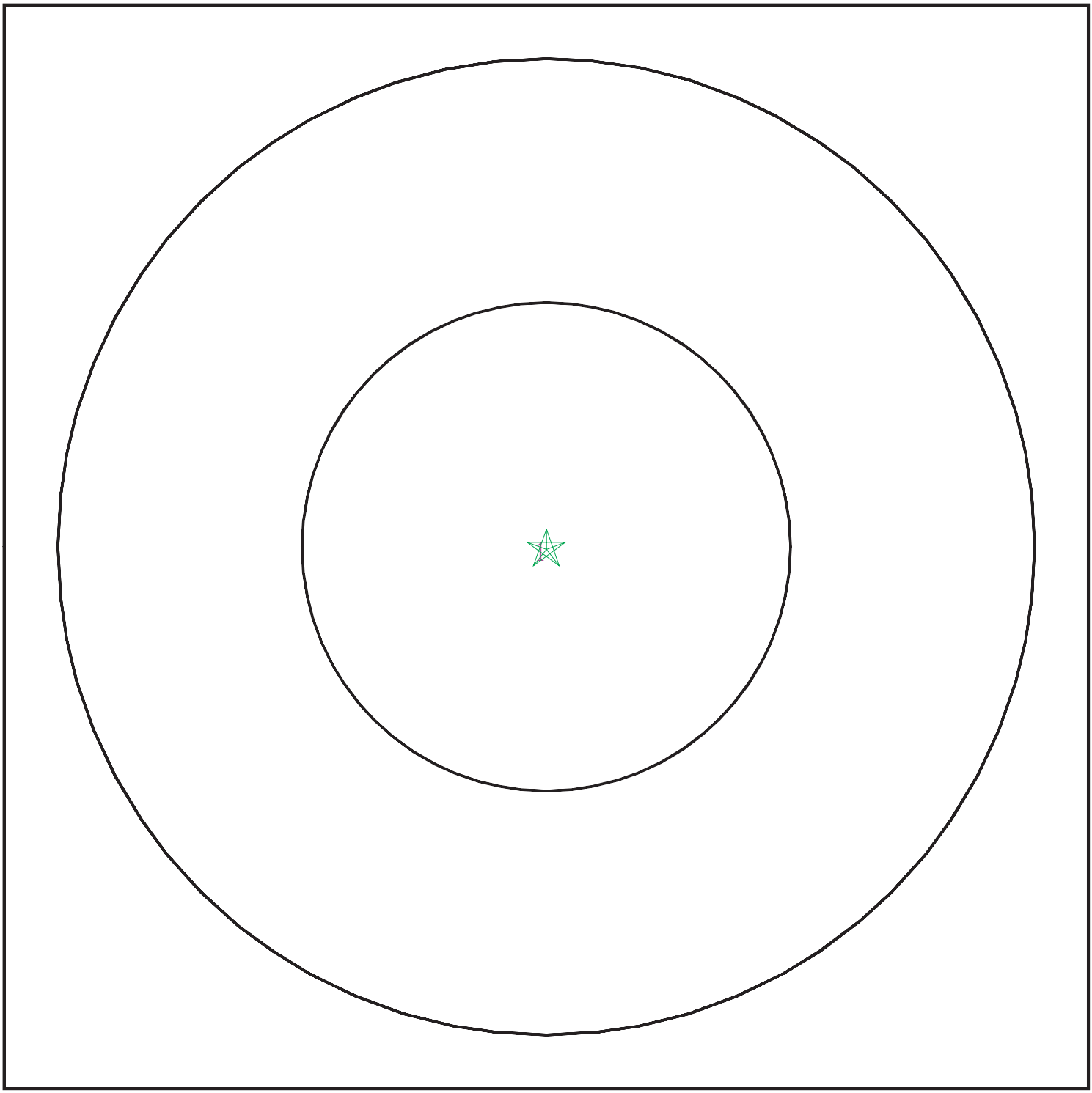
Era:	Cenozoic
System:	Quaternary
Series:	Quaternary
Code:	Q *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 02938729.2r



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Tronox	CLIENT:	Environ Corporation
ADDRESS:	560 W Lake Mead Parkway Henderson NV 89015	CONTACT:	Wendy Seider
LAT/LONG:	36.0445 / 115.0013	INQUIRY #:	02938729.2r
		DATE:	December 07, 2010 9:28 am

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Urban land

Soil Surface Texture:
Hydrologic Group: Not reported

Soil Drainage Class:
Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
9	USGS3088822	0 - 1/8 Mile SW
10	USGS3088816	1/8 - 1/4 Mile South
B11	USGS3088813	1/8 - 1/4 Mile SSW
C12	USGS3088815	1/8 - 1/4 Mile SE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
B13	USGS3088814	1/8 - 1/4 Mile SW
C14	USGS3088818	1/8 - 1/4 Mile SE
B25	USGS3088807	1/8 - 1/4 Mile South
26	USGS3088806	1/8 - 1/4 Mile SSE
31	USGS3088804	1/4 - 1/2 Mile SSW
F32	USGS3088805	1/4 - 1/2 Mile SSE
33	USGS3088811	1/4 - 1/2 Mile SW
G34	USGS3088819	1/4 - 1/2 Mile ESE
G35	USGS3088817	1/4 - 1/2 Mile ESE
F38	USGS3088808	1/4 - 1/2 Mile SE
J78	USGS3088803	1/4 - 1/2 Mile SSW
79	USGS3088810	1/4 - 1/2 Mile ESE
I80	USGS3088801	1/4 - 1/2 Mile South
J83	USGS3100075	1/4 - 1/2 Mile SW
91	USGS3088821	1/4 - 1/2 Mile ESE
L92	USGS3088809	1/4 - 1/2 Mile ESE
93	USGS3100080	1/4 - 1/2 Mile WSW
94	USGS3100069	1/4 - 1/2 Mile SSW
L96	USGS3088812	1/4 - 1/2 Mile ESE
121	USGS3088820	1/4 - 1/2 Mile East
S165	USGS3088825	1/2 - 1 Mile NE
T185	USGS3100073	1/2 - 1 Mile WSW
X223	USGS3088827	1/2 - 1 Mile NE
X227	USGS3088826	1/2 - 1 Mile NE
AC250	USGS3088830	1/2 - 1 Mile NE
AC251	USGS3088829	1/2 - 1 Mile NE
266	USGS3088798	1/2 - 1 Mile SSE
AC267	USGS3088828	1/2 - 1 Mile NE
294	USGS3100102	1/2 - 1 Mile West
AL312	USGS3088795	1/2 - 1 Mile South
315	USGS3088678	1/2 - 1 Mile NNE
AN320	USGS3088682	1/2 - 1 Mile North
323	USGS3100137	1/2 - 1 Mile NNW
AQ349	USGS3088677	1/2 - 1 Mile NNE
AQ350	USGS3088676	1/2 - 1 Mile NNE
AN352	USGS3088683	1/2 - 1 Mile North
AS369	USGS3088685	1/2 - 1 Mile NNW
370	USGS3088681	1/2 - 1 Mile NNE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A1	NV4000000003869	0 - 1/8 Mile SSE
A2	NV4000000003868	0 - 1/8 Mile SSE
A3	NV4000000003870	0 - 1/8 Mile SSE
A4	NV4000000003872	0 - 1/8 Mile SSE
A5	NV4000000003871	0 - 1/8 Mile SSE
A6	NV4000000003873	0 - 1/8 Mile SE
A7	NV4000000003874	0 - 1/8 Mile SE
A8	NV4000000003875	0 - 1/8 Mile SE
D15	NV4000000004131	1/8 - 1/4 Mile North
D16	NV4000000004132	1/8 - 1/4 Mile North
D17	NV4000000004130	1/8 - 1/4 Mile North
D18	NV4000000004128	1/8 - 1/4 Mile North
D19	NV4000000004129	1/8 - 1/4 Mile North
D20	NV4000000004136	1/8 - 1/4 Mile North
D21	NV4000000004137	1/8 - 1/4 Mile North
D22	NV4000000004135	1/8 - 1/4 Mile North
D23	NV4000000004133	1/8 - 1/4 Mile North
D24	NV4000000004134	1/8 - 1/4 Mile North
E27	NV4000000003865	1/8 - 1/4 Mile West
E28	NV4000000003864	1/8 - 1/4 Mile West
E29	NV4000000003867	1/8 - 1/4 Mile West
E30	NV4000000003866	1/8 - 1/4 Mile West
G36	NV4000000003876	1/4 - 1/2 Mile East
G37	NV4000000003877	1/4 - 1/2 Mile East
H39	NV4000000004122	1/4 - 1/2 Mile NW
H40	NV4000000004123	1/4 - 1/2 Mile NW
H41	NV4000000004120	1/4 - 1/2 Mile NW
H42	NV4000000004121	1/4 - 1/2 Mile NW
H43	NV4000000004126	1/4 - 1/2 Mile NW
H44	NV4000000004127	1/4 - 1/2 Mile NW
H45	NV4000000004124	1/4 - 1/2 Mile NW
H46	NV4000000004125	1/4 - 1/2 Mile NW
H47	NV4000000004109	1/4 - 1/2 Mile NW
H48	NV4000000004110	1/4 - 1/2 Mile NW
H49	NV4000000004111	1/4 - 1/2 Mile NW
H50	NV4000000004108	1/4 - 1/2 Mile NW
H51	NV4000000004105	1/4 - 1/2 Mile NW
H52	NV4000000004106	1/4 - 1/2 Mile NW
H53	NV4000000004107	1/4 - 1/2 Mile NW
H54	NV4000000004112	1/4 - 1/2 Mile NW
H55	NV4000000004117	1/4 - 1/2 Mile NW
H56	NV4000000004118	1/4 - 1/2 Mile NW
H57	NV4000000004119	1/4 - 1/2 Mile NW
H58	NV4000000004116	1/4 - 1/2 Mile NW
H59	NV4000000004113	1/4 - 1/2 Mile NW
H60	NV4000000004114	1/4 - 1/2 Mile NW
H61	NV4000000004115	1/4 - 1/2 Mile NW
H62	NV4000000004094	1/4 - 1/2 Mile NW
H63	NV4000000004095	1/4 - 1/2 Mile NW
H64	NV4000000004096	1/4 - 1/2 Mile NW
H65	NV4000000004093	1/4 - 1/2 Mile NW
H66	NV4000000004090	1/4 - 1/2 Mile NW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
H67	NV4000000004091	1/4 - 1/2 Mile NW
H68	NV4000000004092	1/4 - 1/2 Mile NW
H69	NV4000000004097	1/4 - 1/2 Mile NW
H70	NV4000000004102	1/4 - 1/2 Mile NW
H71	NV4000000004103	1/4 - 1/2 Mile NW
H72	NV4000000004104	1/4 - 1/2 Mile NW
H73	NV4000000004101	1/4 - 1/2 Mile NW
H74	NV4000000004098	1/4 - 1/2 Mile NW
H75	NV4000000004099	1/4 - 1/2 Mile NW
H76	NV4000000004100	1/4 - 1/2 Mile NW
I77	NV4000000003586	1/4 - 1/2 Mile South
K81	NV4000000004138	1/4 - 1/2 Mile NE
K82	NV4000000004139	1/4 - 1/2 Mile NE
J84	NV4000000003647	1/4 - 1/2 Mile SW
J85	NV4000000003646	1/4 - 1/2 Mile SW
J86	NV4000000003645	1/4 - 1/2 Mile SW
J87	NV4000000003648	1/4 - 1/2 Mile SW
J88	NV4000000003651	1/4 - 1/2 Mile SW
J89	NV4000000003650	1/4 - 1/2 Mile SW
J90	NV4000000003649	1/4 - 1/2 Mile SW
95	NV4000000003587	1/4 - 1/2 Mile SE
M97	NV4000000003560	1/4 - 1/2 Mile SSE
M98	NV4000000003561	1/4 - 1/2 Mile SSE
N99	NV4000000004406	1/4 - 1/2 Mile North
N100	NV4000000004405	1/4 - 1/2 Mile North
N101	NV4000000004407	1/4 - 1/2 Mile North
N102	NV4000000004409	1/4 - 1/2 Mile North
N103	NV4000000004408	1/4 - 1/2 Mile North
O104	NV4000000003852	1/4 - 1/2 Mile West
O105	NV4000000003851	1/4 - 1/2 Mile West
O106	NV4000000003854	1/4 - 1/2 Mile West
O107	NV4000000003853	1/4 - 1/2 Mile West
O108	NV4000000003848	1/4 - 1/2 Mile West
O109	NV4000000003847	1/4 - 1/2 Mile West
O110	NV4000000003850	1/4 - 1/2 Mile West
O111	NV4000000003849	1/4 - 1/2 Mile West
O112	NV4000000003855	1/4 - 1/2 Mile West
O113	NV4000000003861	1/4 - 1/2 Mile West
O114	NV4000000003860	1/4 - 1/2 Mile West
O115	NV4000000003863	1/4 - 1/2 Mile West
O116	NV4000000003862	1/4 - 1/2 Mile West
O117	NV4000000003857	1/4 - 1/2 Mile West
O118	NV4000000003856	1/4 - 1/2 Mile West
O119	NV4000000003859	1/4 - 1/2 Mile West
O120	NV4000000003858	1/4 - 1/2 Mile West
O122	NV4000000003839	1/4 - 1/2 Mile West
O123	NV4000000003840	1/4 - 1/2 Mile West
O124	NV4000000003838	1/4 - 1/2 Mile West
O125	NV4000000003836	1/4 - 1/2 Mile West
O126	NV4000000003837	1/4 - 1/2 Mile West
O127	NV4000000003841	1/4 - 1/2 Mile West
O128	NV4000000003845	1/4 - 1/2 Mile West

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
O129	NV4000000003846	1/4 - 1/2 Mile West
O130	NV4000000003844	1/4 - 1/2 Mile West
O131	NV4000000003842	1/4 - 1/2 Mile West
O132	NV4000000003843	1/4 - 1/2 Mile West
P133	NV4000000004401	1/4 - 1/2 Mile NNW
P134	NV4000000004400	1/4 - 1/2 Mile NNW
P135	NV4000000004402	1/4 - 1/2 Mile NNW
P136	NV4000000004404	1/4 - 1/2 Mile NNW
P137	NV4000000004403	1/4 - 1/2 Mile NNW
Q138	NV4000000004087	1/4 - 1/2 Mile WNW
Q139	NV4000000004086	1/4 - 1/2 Mile WNW
Q140	NV4000000004089	1/4 - 1/2 Mile WNW
Q141	NV4000000004088	1/4 - 1/2 Mile WNW
Q142	NV4000000004074	1/2 - 1 Mile WNW
Q143	NV4000000004073	1/2 - 1 Mile WNW
Q144	NV4000000004076	1/2 - 1 Mile WNW
Q145	NV4000000004075	1/2 - 1 Mile WNW
Q146	NV4000000004070	1/2 - 1 Mile WNW
Q147	NV4000000004069	1/2 - 1 Mile WNW
Q148	NV4000000004072	1/2 - 1 Mile WNW
Q149	NV4000000004071	1/2 - 1 Mile WNW
Q150	NV4000000004077	1/2 - 1 Mile WNW
Q151	NV4000000004083	1/2 - 1 Mile WNW
Q152	NV4000000004082	1/2 - 1 Mile WNW
Q153	NV4000000004085	1/2 - 1 Mile WNW
Q154	NV4000000004084	1/2 - 1 Mile WNW
Q155	NV4000000004079	1/2 - 1 Mile WNW
Q156	NV4000000004078	1/2 - 1 Mile WNW
Q157	NV4000000004081	1/2 - 1 Mile WNW
Q158	NV4000000004080	1/2 - 1 Mile WNW
R159	NV4000000004016	1/2 - 1 Mile East
S160	NV4000000004411	1/2 - 1 Mile NNE
S161	NV4000000004410	1/2 - 1 Mile NNE
S162	NV4000000004412	1/2 - 1 Mile NNE
S163	NV4000000004414	1/2 - 1 Mile NNE
S164	NV4000000004413	1/2 - 1 Mile NNE
S166	NV4000000004420	1/2 - 1 Mile NNE
S167	NV4000000004419	1/2 - 1 Mile NNE
S168	NV4000000004422	1/2 - 1 Mile NNE
S169	NV4000000004421	1/2 - 1 Mile NNE
S170	NV4000000004416	1/2 - 1 Mile NNE
S171	NV4000000004415	1/2 - 1 Mile NNE
S172	NV4000000004418	1/2 - 1 Mile NNE
S173	NV4000000004417	1/2 - 1 Mile NNE
S174	NV4000000004428	1/2 - 1 Mile NNE
S175	NV4000000004427	1/2 - 1 Mile NNE
S176	NV4000000004430	1/2 - 1 Mile NNE
S177	NV4000000004429	1/2 - 1 Mile NNE
S178	NV4000000004424	1/2 - 1 Mile NNE
S179	NV4000000004423	1/2 - 1 Mile NNE
S180	NV4000000004426	1/2 - 1 Mile NNE
S181	NV4000000004425	1/2 - 1 Mile NNE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
R182	NV4000000004017	1/2 - 1 Mile East
R183	NV4000000004018	1/2 - 1 Mile East
R184	NV4000000004019	1/2 - 1 Mile East
U186	NV4000000003758	1/2 - 1 Mile ESE
U187	NV4000000003757	1/2 - 1 Mile ESE
U188	NV4000000003756	1/2 - 1 Mile ESE
U189	NV4000000003759	1/2 - 1 Mile ESE
U190	NV4000000003762	1/2 - 1 Mile ESE
U191	NV4000000003761	1/2 - 1 Mile ESE
U192	NV4000000003760	1/2 - 1 Mile ESE
T193	NV4000000003628	1/2 - 1 Mile WSW
T194	NV4000000003627	1/2 - 1 Mile WSW
T195	NV4000000003626	1/2 - 1 Mile WSW
T196	NV4000000003631	1/2 - 1 Mile WSW
T197	NV4000000003630	1/2 - 1 Mile WSW
T198	NV4000000003629	1/2 - 1 Mile WSW
T199	NV4000000003622	1/2 - 1 Mile WSW
T200	NV4000000003621	1/2 - 1 Mile WSW
T201	NV4000000003620	1/2 - 1 Mile WSW
T202	NV4000000003625	1/2 - 1 Mile WSW
T203	NV4000000003624	1/2 - 1 Mile WSW
T204	NV4000000003623	1/2 - 1 Mile WSW
T205	NV4000000003632	1/2 - 1 Mile WSW
T206	NV4000000003641	1/2 - 1 Mile WSW
T207	NV4000000003640	1/2 - 1 Mile WSW
T208	NV4000000003639	1/2 - 1 Mile WSW
T209	NV4000000003644	1/2 - 1 Mile WSW
T210	NV4000000003643	1/2 - 1 Mile WSW
T211	NV4000000003642	1/2 - 1 Mile WSW
T212	NV4000000003635	1/2 - 1 Mile WSW
T213	NV4000000003634	1/2 - 1 Mile WSW
T214	NV4000000003633	1/2 - 1 Mile WSW
T215	NV4000000003638	1/2 - 1 Mile WSW
T216	NV4000000003637	1/2 - 1 Mile WSW
T217	NV4000000003636	1/2 - 1 Mile WSW
V218	NV4000000003391	1/2 - 1 Mile South
V219	NV4000000003392	1/2 - 1 Mile South
W220	NV4000000004534	1/2 - 1 Mile NNE
W221	NV4000000004535	1/2 - 1 Mile NNE
W222	NV4000000004536	1/2 - 1 Mile NNE
Y224	NV4000000003388	1/2 - 1 Mile SSW
Y225	NV4000000003389	1/2 - 1 Mile SSW
Y226	NV4000000003390	1/2 - 1 Mile SSW
Z228	NV4000000004275	1/2 - 1 Mile ENE
Z229	NV4000000004274	1/2 - 1 Mile ENE
Z230	NV4000000004277	1/2 - 1 Mile ENE
Z231	NV4000000004276	1/2 - 1 Mile ENE
AA232	NV4000000003393	1/2 - 1 Mile SSE
AA233	NV4000000003394	1/2 - 1 Mile SSE
Z234	NV4000000004278	1/2 - 1 Mile ENE
AB235	NV4000000004399	1/2 - 1 Mile NW
AB236	NV4000000004389	1/2 - 1 Mile NW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
AB237	NV4000000004390	1/2 - 1 Mile NW
AB238	NV4000000004391	1/2 - 1 Mile NW
AB239	NV4000000004386	1/2 - 1 Mile NW
AB240	NV4000000004387	1/2 - 1 Mile NW
AB241	NV4000000004388	1/2 - 1 Mile NW
AB242	NV4000000004392	1/2 - 1 Mile NW
AB243	NV4000000004396	1/2 - 1 Mile NW
AB244	NV4000000004397	1/2 - 1 Mile NW
AB245	NV4000000004398	1/2 - 1 Mile NW
AB246	NV4000000004393	1/2 - 1 Mile NW
AB247	NV4000000004394	1/2 - 1 Mile NW
AB248	NV4000000004395	1/2 - 1 Mile NW
249	NV4000000004533	1/2 - 1 Mile NNW
AD252	NV4000000003540	1/2 - 1 Mile SE
AD253	NV4000000003541	1/2 - 1 Mile SE
AE254	NV4000000004638	1/2 - 1 Mile North
AE255	NV4000000004639	1/2 - 1 Mile North
AE256	NV4000000004642	1/2 - 1 Mile North
AE257	NV4000000004641	1/2 - 1 Mile North
AE258	NV4000000004640	1/2 - 1 Mile North
AE259	NV4000000004645	1/2 - 1 Mile North
AE260	NV4000000004644	1/2 - 1 Mile North
AE261	NV4000000004643	1/2 - 1 Mile North
AF262	NV4000000003833	1/2 - 1 Mile West
AF263	NV4000000003832	1/2 - 1 Mile West
AF264	NV4000000003835	1/2 - 1 Mile West
AF265	NV4000000003834	1/2 - 1 Mile West
AF268	NV4000000003825	1/2 - 1 Mile West
AF269	NV4000000003826	1/2 - 1 Mile West
AF270	NV4000000003824	1/2 - 1 Mile West
AF271	NV4000000003822	1/2 - 1 Mile West
AF272	NV4000000003823	1/2 - 1 Mile West
AF273	NV4000000003830	1/2 - 1 Mile West
AF274	NV4000000003831	1/2 - 1 Mile West
AF275	NV4000000003829	1/2 - 1 Mile West
AF276	NV4000000003827	1/2 - 1 Mile West
AF277	NV4000000003828	1/2 - 1 Mile West
AG278	NV4000000004631	1/2 - 1 Mile NNW
AG279	NV4000000004632	1/2 - 1 Mile NNW
AG280	NV4000000004629	1/2 - 1 Mile NNW
AG281	NV4000000004630	1/2 - 1 Mile NNW
AG282	NV4000000004633	1/2 - 1 Mile NNW
AG283	NV4000000004636	1/2 - 1 Mile NNW
AG284	NV4000000004637	1/2 - 1 Mile NNW
AG285	NV4000000004634	1/2 - 1 Mile NNW
AG286	NV4000000004635	1/2 - 1 Mile NNW
AH287	NV4000000003589	1/2 - 1 Mile ESE
AH288	NV4000000003588	1/2 - 1 Mile ESE
AH289	NV4000000003591	1/2 - 1 Mile ESE
AH290	NV4000000003590	1/2 - 1 Mile ESE
AG291	NV4000000004626	1/2 - 1 Mile NNW
AG292	NV4000000004627	1/2 - 1 Mile NNW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

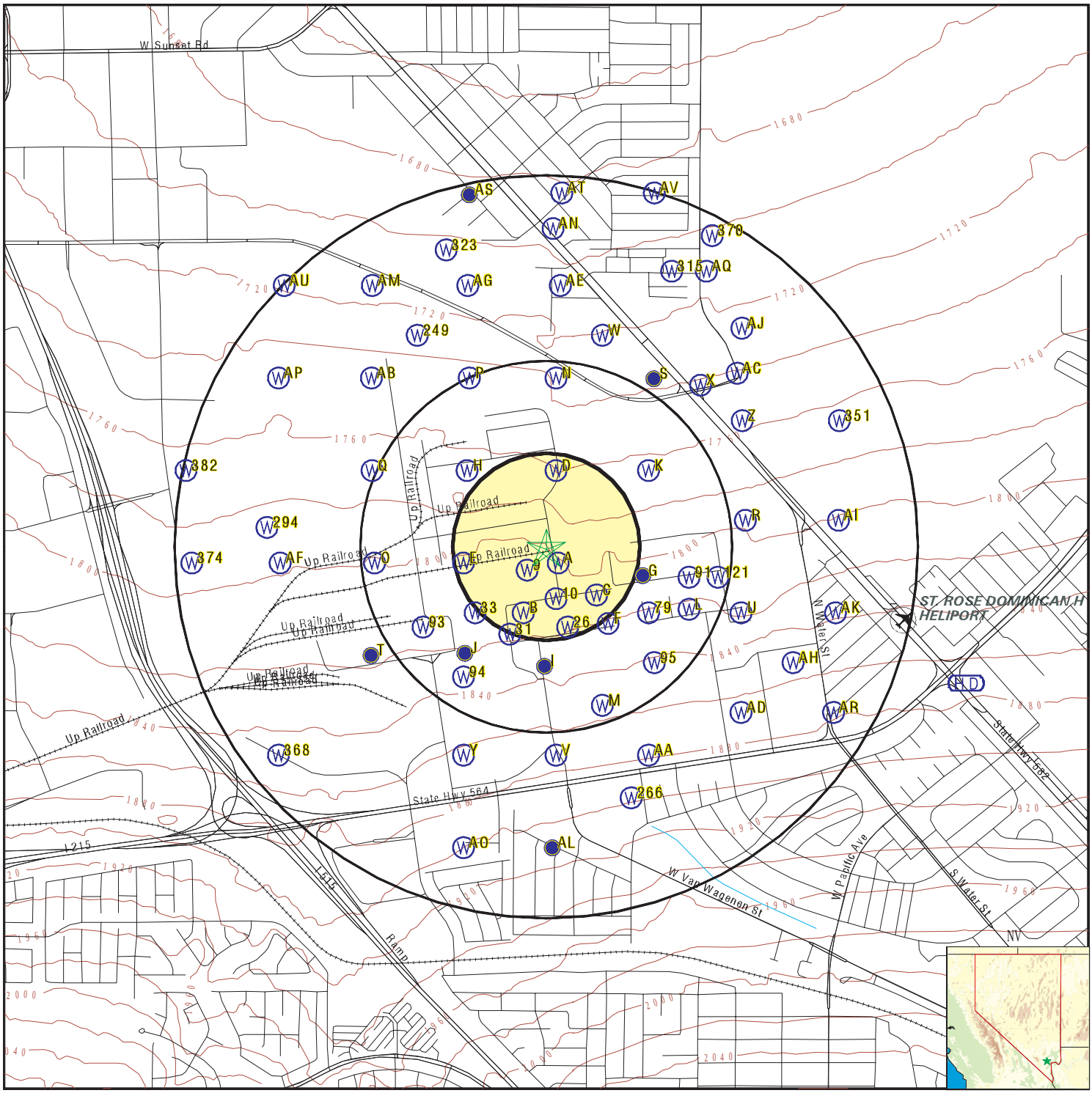
MAP ID	WELL ID	LOCATION FROM TP
AG293	NV4000000004628	1/2 - 1 Mile NNW
AI295	NV4000000004020	1/2 - 1 Mile East
AJ296	NV4000000004547	1/2 - 1 Mile NE
AJ297	NV4000000004546	1/2 - 1 Mile NE
AJ298	NV4000000004545	1/2 - 1 Mile NE
AJ299	NV4000000004550	1/2 - 1 Mile NE
AJ300	NV4000000004549	1/2 - 1 Mile NE
AJ301	NV4000000004548	1/2 - 1 Mile NE
AI302	NV4000000004023	1/2 - 1 Mile East
AI303	NV4000000004022	1/2 - 1 Mile East
AI304	NV4000000004021	1/2 - 1 Mile East
AI305	NV4000000004026	1/2 - 1 Mile East
AI306	NV4000000004025	1/2 - 1 Mile East
AI307	NV4000000004024	1/2 - 1 Mile East
AK308	NV4000000003763	1/2 - 1 Mile ESE
AK309	NV4000000003764	1/2 - 1 Mile ESE
AJ310	NV4000000004551	1/2 - 1 Mile NE
AK311	NV4000000003765	1/2 - 1 Mile ESE
AL313	NV4000000003116	1/2 - 1 Mile South
AL314	NV4000000003117	1/2 - 1 Mile South
AM316	NV4000000004623	1/2 - 1 Mile NNW
AM317	NV4000000004622	1/2 - 1 Mile NNW
AM318	NV4000000004625	1/2 - 1 Mile NNW
AM319	NV4000000004624	1/2 - 1 Mile NNW
AO321	NV4000000003114	1/2 - 1 Mile SSW
AO322	NV4000000003115	1/2 - 1 Mile SSW
AM324	NV4000000004612	1/2 - 1 Mile NW
AM325	NV4000000004613	1/2 - 1 Mile NW
AM326	NV4000000004614	1/2 - 1 Mile NW
AM327	NV4000000004611	1/2 - 1 Mile NW
AM328	NV4000000004608	1/2 - 1 Mile NW
AM329	NV4000000004609	1/2 - 1 Mile NW
AM330	NV4000000004610	1/2 - 1 Mile NW
AM331	NV4000000004619	1/2 - 1 Mile NW
AM332	NV4000000004620	1/2 - 1 Mile NW
AM333	NV4000000004621	1/2 - 1 Mile NW
AM334	NV4000000004618	1/2 - 1 Mile NW
AM335	NV4000000004615	1/2 - 1 Mile NW
AM336	NV4000000004616	1/2 - 1 Mile NW
AM337	NV4000000004617	1/2 - 1 Mile NW
AP338	NV4000000004378	1/2 - 1 Mile WNW
AP339	NV4000000004379	1/2 - 1 Mile WNW
AP340	NV4000000004377	1/2 - 1 Mile WNW
AP341	NV4000000004375	1/2 - 1 Mile WNW
AP342	NV4000000004376	1/2 - 1 Mile WNW
AP343	NV4000000004380	1/2 - 1 Mile WNW
AP344	NV4000000004384	1/2 - 1 Mile WNW
AP345	NV4000000004385	1/2 - 1 Mile WNW
AP346	NV4000000004383	1/2 - 1 Mile WNW
AP347	NV4000000004381	1/2 - 1 Mile WNW
AP348	NV4000000004382	1/2 - 1 Mile WNW
351	NV4000000004279	1/2 - 1 Mile ENE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
AR353	NV4000000003546	1/2 - 1 Mile ESE
AR354	NV4000000003547	1/2 - 1 Mile ESE
AR355	NV4000000003548	1/2 - 1 Mile ESE
AR356	NV4000000003545	1/2 - 1 Mile ESE
AR357	NV4000000003542	1/2 - 1 Mile ESE
AR358	NV4000000003543	1/2 - 1 Mile ESE
AR359	NV4000000003544	1/2 - 1 Mile ESE
AR360	NV4000000003549	1/2 - 1 Mile ESE
AR361	NV4000000003554	1/2 - 1 Mile ESE
AR362	NV4000000003555	1/2 - 1 Mile ESE
AR363	NV4000000003556	1/2 - 1 Mile ESE
AR364	NV4000000003553	1/2 - 1 Mile ESE
AR365	NV4000000003550	1/2 - 1 Mile ESE
AR366	NV4000000003551	1/2 - 1 Mile ESE
AR367	NV4000000003552	1/2 - 1 Mile ESE
368	NV4000000003387	1/2 - 1 Mile SW
AT371	NV4000000004786	1/2 - 1 Mile North
AT372	NV4000000004787	1/2 - 1 Mile North
AT373	NV4000000004788	1/2 - 1 Mile North
374	NV4000000003821	1/2 - 1 Mile West
AS375	NV4000000004781	1/2 - 1 Mile NNW
AS376	NV4000000004780	1/2 - 1 Mile NNW
AS377	NV4000000004779	1/2 - 1 Mile NNW
AS378	NV4000000004782	1/2 - 1 Mile NNW
AS379	NV4000000004785	1/2 - 1 Mile NNW
AS380	NV4000000004784	1/2 - 1 Mile NNW
AS381	NV4000000004783	1/2 - 1 Mile NNW
382	NV4000000004068	1/2 - 1 Mile WNW
AU383	NV4000000004596	1/2 - 1 Mile NW
AU384	NV4000000004595	1/2 - 1 Mile NW
AU385	NV4000000004598	1/2 - 1 Mile NW
AU386	NV4000000004597	1/2 - 1 Mile NW
AU387	NV4000000004592	1/2 - 1 Mile NW
AU388	NV4000000004591	1/2 - 1 Mile NW
AU389	NV4000000004594	1/2 - 1 Mile NW
AU390	NV4000000004593	1/2 - 1 Mile NW
AU391	NV4000000004599	1/2 - 1 Mile NW
AU392	NV4000000004605	1/2 - 1 Mile NW
AU393	NV4000000004604	1/2 - 1 Mile NW
AU394	NV4000000004607	1/2 - 1 Mile NW
AU395	NV4000000004606	1/2 - 1 Mile NW
AU396	NV4000000004601	1/2 - 1 Mile NW
AU397	NV4000000004600	1/2 - 1 Mile NW
AU398	NV4000000004603	1/2 - 1 Mile NW
AU399	NV4000000004602	1/2 - 1 Mile NW
AV400	NV4000000004790	1/2 - 1 Mile NNE
AV401	NV4000000004789	1/2 - 1 Mile NNE
AV402	NV4000000004791	1/2 - 1 Mile NNE
AV403	NV4000000004793	1/2 - 1 Mile NNE
AV404	NV4000000004792	1/2 - 1 Mile NNE

PHYSICAL SETTING SOURCE MAP - 02938729.2r



- County Boundary
- Major Roads
- Contour Lines
- Airports
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons

- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data

SITE NAME:	Tronox	CLIENT:	Environ Corporation
ADDRESS:	560 W Lake Mead Parkway Henderson NV 89015	CONTACT:	Wendy Seider
LAT/LONG:	36.0445 / 115.0013	INQUIRY #:	02938729.2r
		DATE:	December 07, 2010 9:28 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

A1
SSE
0 - 1/8 Mile
Higher | **NV WELLS** | **NV4000000003869**

Well log:	109299	App:	Not Reported
Notice of :	34497	Waiver no:	Not Reported
Date log r:	10/23/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	S OF WARM SPRINGS RD & E OF 4TH ST		
Owner no:	M-153		
Parcel no:	178-12-801-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/02/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	146
Depth dril:	170	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	170
Csng diame:	2.375		
Csng reduc:	0	Top perf:	150
Bottom per:	170	Perf inter:	1
Static wl:	32.5		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/09/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/25/2009
Gravel p 1:	146	Gravel p 2:	170
Utm x:	680170.950975		
Utm y:	3990466.51799		
Site id:	NV4000000003869		

A2
SSE
0 - 1/8 Mile
Higher | **NV WELLS** | **NV4000000003868**

Well log:	109173	App:	Not Reported
Notice of :	32197	Waiver no:	Not Reported
Date log r:	11/16/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	S OF WARM SPRINGS & E OF 4TH ST		
Owner no:	Not Reported		
Parcel no:	178-12-801-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/24/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	47	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	47
Csng diame:	2		
Csng reduc:	0	Top perf:	32
Bottom per:	47	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2097	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	10/24/2009
Gravel p 1:	30	Gravel p 2:	47
Utm x:	680170.950975		
Utm y:	3990466.51799		
Site id:	NV4000000003868		

A3
SSE
0 - 1/8 Mile
Higher

NV WELLS **NV4000000003870**

Well log:	109300	App:	Not Reported
Notice of :	34497	Waiver no:	Not Reported
Date log r:	10/23/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC

Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	S OF WARM SPRINGS RD & E OF 4TH ST		
Owner no:	M-148		
Parcel no:	178-12-801-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/18/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.375		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	45		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/09/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/14/2009
Gravel p 1:	25	Gravel p 2:	50
Utm x:	680170.950975		
Utm y:	3990466.51799		
Site id:	NV4000000003870		

A4
SSE
0 - 1/8 Mile
Higher

NV WELLS **NV4000000003872**

Well log:	109302	App:	Not Reported
Notice of :	34497	Waiver no:	Not Reported
Date log r:	10/23/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	S OF WARM SPRINGS RD & E OF 4TH ST		
Owner no:	M-141		
Parcel no:	178-12-801-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/06/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.375		
Csng reduc:	0	Top perf:	38
Bottom per:	48	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/09/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	08/01/2009
Gravel p 1:	28	Gravel p 2:	50
Utm x:	680170.950975		
Utm y:	3990466.51799		
Site id:	NV4000000003872		

A5
SSE
0 - 1/8 Mile
Higher

NV WELLS **NV4000000003871**

Well log:	109301	App:	Not Reported
Notice of :	34497	Waiver no:	Not Reported
Date log r:	10/23/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	S OF WARM SPRINGS RD & E OF 4TH ST		
Owner no:	M-149		
Parcel no:	178-12-801-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/22/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	96
Depth dril:	120	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	120
Csng diame:	2.375		
Csng reduc:	0	Top perf:	100
Bottom per:	120	Perf inter:	1
Static wl:	43		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/09/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/16/2009
Gravel p 1:	96	Gravel p 2:	120
Utm x:	680170.950975		
Utm y:	3990466.51799		
Site id:	NV4000000003871		

A6
SE
0 - 1/8 Mile
Higher

NV WELLS **NV4000000003873**

Well log:	38902	App:	Not Reported
Notice of :	0	Waiver no:	MO-2100
Date log r:	07/27/1992	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	Not Reported		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/27/1991	Date cmplt:	D
Gravel pac:	Y	Depth seal:	22
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	42
Csng diame:	2		
Csng reduc:	0	Top perf:	27
Bottom per:	42	Perf inter:	1
Static wl:	30		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	GREGORY A OGLE		
Contract 2:	3011 W TOMKINS LAS VEGAS NV		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	KLOHAIR	Date entry:	12/09/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/27/1991
Gravel p 1:	24	Gravel p 2:	42

Utm x:	680195.977872
Utm y:	3990467.03227
Site id:	NV4000000003873

A7
SE
0 - 1/8 Mile
Higher

NV WELLS **NV4000000003874**

Well log:	50752	App:	Not Reported
Notice of :	16127	Waiver no:	MO-2611
Date log r:	01/09/1996	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	MW-12		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/01/1995	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	3		
Csng reduc:	0	Top perf:	40
Bottom per:	50	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	290	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/25/1996
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/30/1995
Gravel p 1:	30	Gravel p 2:	50
Utm x:	680195.977872		
Utm y:	3990467.03227		
Site id:	NV4000000003874		

Map ID Direction Distance Elevation			Database	EDR ID Number
A8 **SE** **0 - 1/8 Mile** **Higher**			**NV WELLS**	**NV4000000003875**

Well log:	50812	App:	Not Reported
Notice of :	16127	Waiver no:	MO-2611
Date log r:	01/09/1996	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	M-12		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/01/1995	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	3		
Csng reduc:	0	Top perf:	40
Bottom per:	50	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	290	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/16/1996
Update use:	klohair	Date updat:	10/16/1996
Edit statu:	F	Well start:	08/30/1995
Gravel p 1:	30	Gravel p 2:	50
Utm x:	680195.977872		
Utm y:	3990467.03227		
Site id:	NV4000000003875		

9 **SW** **0 - 1/8 Mile** **Higher**		**FED USGS**	**USGS3088822**

Agency cd:	USGS	Site no:	360237115000501
Site name:	212 S22 E62 12CCCA1 BMI		
Latitude:	360237	EDR Site id:	USGS3088822
Longitude:	1150005	Dec lat:	36.04358728
Dec lon:	-115.00221549	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSWSWS12 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1795.30		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	194	Hole depth:	194
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	115.30		1942-01-01	115.30	
1942	0.00		1942	0.00	

10
South
1/8 - 1/4 Mile
Higher

FED USGS **USGS3088816**

Agency cd:	USGS	Site no:	360233115000001
Site name:	212 S22 E62 12DCDD1 BMI		
Latitude:	360233	EDR Site id:	USGS3088816
Longitude:	1150000	Dec lat:	36.04247622
Dec lon:	-115.00082654	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESWSES12 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000

Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	182	Hole depth:	182
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-05-12	0.00		1942-05-12	0.00	

B11
SSW
1/8 - 1/4 Mile
Higher

FED USGS USGS3088813

Agency cd:	USGS	Site no:	360232115000501
Site name:	212 S22 E62 12DCCC1 BMI		
Latitude:	360232	EDR Site id:	USGS3088813
Longitude:	1150005	Dec lat:	36.04219842
Dec lon:	-115.00221544	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESWSWS12 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	157	Hole depth:	157
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count: 0
Water quality data begin date: 0000-00-00
Water quality data end date: 0000-00-00
Water quality data count: 0
Ground water data begin date: 1942-00-00
Ground water data end date: 1942-01-01
Ground water data count: 2

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	103.00		1942-01-01	103.00	
1942	103		1942	103	

C12
SE
1/8 - 1/4 Mile
Higher

FED USGS **USGS3088815**

Agency cd: USGS
Site no: 360233114595501
Site name: 212 S22 E62 12DCDC1 BMI-06
Latitude: 360233
EDR Site id: USGS3088815
Longitude: 1145955
Dec lat: 36.04247624
Dec lon: -114.99943759
Coor meth: M
Coor accr: S
Latlong datum: NAD27
Dec latlong datum: NAD83
District: 32
State: 32
County: 003
Country: US
Land net: SESWSES12 T22S R62E M
Location map: HENDERSON, NV
Map scale: 24000
Altitude: 1811.00
Altitude method: Level or other surveying method
Altitude accuracy: 2
Altitude datum: National Geodetic Vertical Datum of 1929
Hydrologic: Las Vegas Wash. Nevada. Area = 1860 sq.mi.
Topographic: Not Reported
Site type: Ground-water other than Spring
Date construction: Not Reported
Date inventoried: Not Reported
Mean greenwich time offset: PST
Local standard time flag: Y
Type of ground water site: Single well, other than collector or Ranney type
Aquifer Type: Not Reported
Aquifer: Not Reported
Well depth: 156
Hole depth: 156
Source of depth data: Not Reported
Project number: NV-79-081
Real time data flag: 0
Daily flow data begin date: 0000-00-00
Daily flow data end date: 0000-00-00
Daily flow data count: 0
Peak flow data begin date: 0000-00-00
Peak flow data end date: 0000-00-00
Peak flow data count: 0
Water quality data begin date: 0000-00-00
Water quality data end date: 0000-00-00
Water quality data count: 0
Ground water data begin date: 1942-05-12
Ground water data end date: 1942-05-12
Ground water data count: 1

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-05-12	110		1942-05-12	110	

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

B13
SW
1/8 - 1/4 Mile
Higher

FED USGS **USGS3088814**

Agency cd:	USGS	Site no:	360232115000901
Site name:	212 S22 E62 12CDDD1 BMI		
Latitude:	360232	EDR Site id:	USGS3088814
Longitude:	1150009	Dec lat:	36.0421984
Dec lon:	-115.00332658	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSESES12 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	206	Hole depth:	206
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	107.00		1942-01-01	107.00	
1942	107		1942	107	

C14
SE
1/8 - 1/4 Mile
Higher

FED USGS **USGS3088818**

Agency cd:	USGS	Site no:	360234114595101
Site name:	212 S22 E62 12DDCC1 BMI		
Latitude:	360234	EDR Site id:	USGS3088818
Longitude:	1145951	Dec lat:	36.04275403
Dec lon:	-114.99832645	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESESWS12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	156	Hole depth:	156
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-05-12	0.00		1942-05-12	0.00	

D15
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004131**

Well log:	89771	App:	Not Reported
Notice of :	25300	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB

Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	M-59		
Parcel no:	178-12-701-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/07/2003
Edit statu:	F	Well start:	06/17/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004131		

D16
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004132**

Well log:	89783	App:	Not Reported
Notice of :	24813	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	M-17R		
Parcel no:	178-12-701-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	45	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2		
Csng reduc:	0	Top perf:	35
Bottom per:	45	Perf inter:	1
Static wl:	20		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/07/2003
Edit statu:	F	Well start:	06/18/2003
Gravel p 1:	5	Gravel p 2:	30
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004132		

D17
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004130**

Well log:	89767	App:	Not Reported
Notice of :	25298	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	M-27		
Parcel no:	178-12-701-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/07/2003
Edit statu:	F	Well start:	06/17/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004130		

D18
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004128**

Well log:	89765	App:	Not Reported
Notice of :	25295	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	MC15		
Parcel no:	178-12-701-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	5
Depth dril:	41	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	41
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/15/2003
Edit statu:	F	Well start:	06/17/2003
Gravel p 1:	0	Gravel p 2:	0

Utm x:	680162.719372
Utm y:	3990867.11165
Site id:	NV4000000004128

D19
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004129**

Well log:	89766	App:	Not Reported
Notice of :	25296	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	I-02		
Parcel no:	178-12-701-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	4		
Csng reduc:	0	Top perf:	15
Bottom per:	35	Perf inter:	1
Static wl:	16		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/07/2003
Edit statu:	F	Well start:	06/18/2003
Gravel p 1:	5	Gravel p 2:	11
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004129		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

D20
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004136**

Well log:	109147	App:	Not Reported
Notice of :	32372	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	S OF WARM SPRINGS RD & W OF BOULDER HWY		
Owner no:	M-155		
Parcel no:	178-12-201-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/09/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	194
Depth dril:	220	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	220
Csng diame:	2.375		
Csng reduc:	0	Top perf:	200
Bottom per:	220	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	07/07/2003
Edit statu:	F	Well start:	10/04/2009
Gravel p 1:	194	Gravel p 2:	220
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004136		

D21
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004137**

Well log:	109148	App:	Not Reported
Notice of :	32372	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	S OF WARM SPRINGS RD & W OF BOULDER HWY		
Owner no:	M-151		
Parcel no:	178-12-201-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/05/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	120
Depth dril:	145	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	145
Csng diame:	2.375		
Csng reduc:	0	Top perf:	125
Bottom per:	145	Perf inter:	1
Static wl:	14		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	07/07/2003
Edit statu:	F	Well start:	09/24/2009
Gravel p 1:	120	Gravel p 2:	145
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004137		

D22
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004135**

Well log:	109146	App:	Not Reported
Notice of :	32376	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB

Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	S OF WARM SPRINGS RD & W OF BOULDER HWY		
Owner no:	M-150		
Parcel no:	178-12-701-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/21/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	120
Depth dril:	145	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	145
Csng diame:	2.375		
Csng reduc:	0	Top perf:	125
Bottom per:	145	Perf inter:	1
Static wl:	21		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	07/07/2003
Edit statu:	F	Well start:	09/17/2009
Gravel p 1:	120	Gravel p 2:	145
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004135		

D23
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004133**

Well log:	109144	App:	Not Reported
Notice of :	34494	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	S OF WARM SPRINGS RD & W OF BOULDER HWY		
Owner no:	M-147		
Parcel no:	178-12-701-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/17/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	40	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2.375		
Csng reduc:	0	Top perf:	25
Bottom per:	40	Perf inter:	1
Static wl:	34		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	07/07/2003
Edit statu:	F	Well start:	08/15/2009
Gravel p 1:	20	Gravel p 2:	40
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004133		

D24
North
1/8 - 1/4 Mile
Lower

NV WELLS **NV4000000004134**

Well log:	109145	App:	Not Reported
Notice of :	32376	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	S OF WARM SPRINGS RD & W OF BOULDER HWY		
Owner no:	M-154		
Parcel no:	178-12-701-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/09/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	171
Depth dril:	195	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	195
Csng diame:	2.375		
Csng reduc:	0	Top perf:	175
Bottom per:	195	Perf inter:	1
Static wl:	18		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	07/07/2003
Edit statu:	F	Well start:	09/30/2009
Gravel p 1:	171	Gravel p 2:	195
Utm x:	680162.719372		
Utm y:	3990867.11165		
Site id:	NV4000000004134		

B25
South
1/8 - 1/4 Mile
Higher

FED USGS **USGS3088807**

Agency cd:	USGS	Site no:	360229115000301
Site name:	212 S22 E62 13ABBD1 BMI		
Latitude:	360229	EDR Site id:	USGS3088807
Longitude:	1150003	Dec lat:	36.04136512
Dec lon:	-115.00165985	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENWNWS13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	254	Hole depth:	254
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	168.00		1942-01-01	168.00	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942	168		1942	168	

26
SSE
1/8 - 1/4 Mile
Higher

FED USGS **USGS3088806**

Agency cd:	USGS	Site no:	360229114595801
Site name:	212 S22 E62 13ABAB1 BMI		
Latitude:	360229	EDR Site id:	USGS3088806
Longitude:	1145958	Dec lat:	36.04136514
Dec lon:	-115.00027092	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENWNES13 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	194	Hole depth:	194
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	187.00		1942-01-01	187.00	
1942	187		1942	187	

E27
West
1/8 - 1/4 Mile
Higher

NV WELLS **NV4000000003865**

Well log:	77682	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-05		
Parcel no:	178-12-401-009	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/22/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	211
Depth dril:	252	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	251
Csng diame:	4.5		
Csng reduc:	0	Top perf:	221
Bottom per:	251	Perf inter:	1
Static wl:	14.6		
Temperatur:	0		
Yield:	3.5		
Drawdown:	0		
Hours pump:	.75		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	DSDAVIS	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/16/1999
Gravel p 1:	211	Gravel p 2:	251
Utm x:	679770.520804		
Utm y:	3990458.29926		
Site id:	NV4000000003865		

E28
West
1/8 - 1/4 Mile
Higher

NV WELLS **NV4000000003864**

Well log:	77671	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CD

Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-06		
Parcel no:	178-12-401-009	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/24/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	55
Depth dril:	80	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	80
Csng diame:	4.5		
Csng reduc:	0	Top perf:	60
Bottom per:	80	Perf inter:	1
Static wl:	37.6		
Temperatur:	0		
Yield:	10		
Drawdown:	0		
Hours pump:	1		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	Not Reported	Date updat:	09/28/1999
Edit statu:	F	Well start:	09/24/1999
Gravel p 1:	55	Gravel p 2:	80
Utm x:	679770.520804		
Utm y:	3990458.29926		
Site id:	NV4000000003864		

E29
West
1/8 - 1/4 Mile
Higher

NV WELLS **NV4000000003867**

Well log:	109151	App:	Not Reported
Notice of :	34495	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	N OF LAKE MEAD & E OF 4TH ST		
Owner no:	M-143		
Parcel no:	178-12-401-009	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/04/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	47	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2.375		
Csng reduc:	0	Top perf:	35
Bottom per:	45	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/03/2009
Gravel p 1:	30	Gravel p 2:	47
Utm x:	679770.520804		
Utm y:	3990458.29926		
Site id:	NV4000000003867		

E30
West
1/8 - 1/4 Mile
Higher

NV WELLS **NV4000000003866**

Well log:	94670	App:	Not Reported
Notice of :	27345	Waiver no:	Not Reported
Date log r:	01/11/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-401-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/07/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	33
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2		
Csng reduc:	0	Top perf:	35
Bottom per:	45	Perf inter:	1
Static wl:	32		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	55860		
Contract 1:	T E N V WELL & ENVIRO SERVICES		
Contract 2:	1973 N NELLIS BLVD BOX 303 LAS VEGAS NV 89115		
Contract 3:	0		
Driller li:	1953	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/12/2005
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	12/07/2004
Gravel p 1:	33	Gravel p 2:	45
Utm x:	679770.520804		
Utm y:	3990458.29926		
Site id:	NV4000000003866		

31
SSW
1/4 - 1/2 Mile
Higher

FED USGS **USGS3088804**

Agency cd:	USGS	Site no:	360228115000801
Site name:	212 S22 E62 13BAAA1 BMI		
Latitude:	360228	EDR Site id:	USGS3088804
Longitude:	1150008	Dec lat:	36.04108732
Dec lon:	-115.00304875	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNENES13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	228	Hole depth:	228
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	218.00		1942-01-01	218.00	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942	218		1942	218	

F32
SSE **FED USGS** **USGS3088805**
1/4 - 1/2 Mile
Higher

Agency cd:	USGS	Site no:	360229114595301
Site name:	212 S22 E62 13ABAA1 BMI		
Latitude:	360229	EDR Site id:	USGS3088805
Longitude:	1145953	Dec lat:	36.04136516
Dec lon:	-114.99888198	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENWNES13 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	244	Hole depth:	244
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	242.00		1942-01-01	242.00	
1942	242		1942	242	

33
SW **FED USGS** **USGS3088811**
1/4 - 1/2 Mile
Higher

Agency cd:	USGS	Site no:	360231115001401
Site name:	212 S22 E62 13BABA1 BMI		
Latitude:	360231	EDR Site id:	USGS3088811
Longitude:	1150014	Dec lat:	36.04192061
Dec lon:	-115.00471548	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENENWS13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	206	Hole depth:	206
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	130.00		1942-01-01	130.00	
1942	130		1942	130	

G34
ESE
1/4 - 1/2 Mile
Higher

FED USGS **USGS3088819**

Agency cd:	USGS	Site no:	360235114594601
Site name:	212 S22 E62 12DDDB1 BMI		
Latitude:	360235	EDR Site id:	USGS3088819
Longitude:	1145946	Dec lat:	36.04303182
Dec lon:	-114.99693752	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESESES12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000

Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	156	Hole depth:	156
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-00-00
Ground water data count:	1		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942	0.00		1942	0.00	

G35
ESE
1/4 - 1/2 Mile
Higher

FED USGS USGS3088817

Agency cd:	USGS	Site no:	360234114594601
Site name:	212 S22 E62 12DDCA1 BMI		
Latitude:	360234	EDR Site id:	USGS3088817
Longitude:	1145946	Dec lat:	36.04275405
Dec lon:	-114.99693751	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESESWS12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	156	Hole depth:	156
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count: 0
Water quality data begin date: 0000-00-00
Water quality data end date: 0000-00-00
Water quality data count: 0
Ground water data begin date: 1942-05-12
Ground water data end date: 1942-05-12
Ground water data count: 1

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-05-12	119		1942-05-12	119	

G36
East
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003876**

Well log:	86654	App:	Not Reported
Notice of :	21217	Waiver no:	Not Reported
Date log r:	06/27/2002	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-201-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/15/2001	Date cmplt:	D
Gravel pac:	Y	Depth seal:	7
Depth dril:	47	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	47
Csng diame:	2		
Csng reduc:	0	Top perf:	7
Bottom per:	47	Perf inter:	1
Static wl:	5		
Temperatur:	78		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	19101		
Contract 1:	LAYNE CHRISTENSEN CO		
Contract 2:	12030 E RIGGS RD CHANDLER AZ 85249		
Contract 3:	0		
Driller li:	2021	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/04/2002
Update use:	Not Reported	Date updat:	10/16/1996
Edit statu:	F	Well start:	03/15/2001
Gravel p 1:	7	Gravel p 2:	47

Utm x:	680571.381482
Utm y:	3990474.75504
Site id:	NV4000000003876

G37
East
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003877**

Well log:	89784	App:	Not Reported
Notice of :	24814	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	M-31R		
Parcel no:	178-12-801-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	2		
Csng reduc:	0	Top perf:	35
Bottom per:	55	Perf inter:	1
Static wl:	45		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/07/2003
Edit statu:	F	Well start:	06/18/2003
Gravel p 1:	5	Gravel p 2:	30
Utm x:	680571.381482		
Utm y:	3990474.75504		
Site id:	NV4000000003877		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

F38
SE
1/4 - 1/2 Mile
Higher | **FED USGS** | **USGS3088808**

Agency cd:	USGS	Site no:	360230114594901
Site name:	212 S22 E62 13AABA1 BMI		
Latitude:	360230	EDR Site id:	USGS3088808
Longitude:	1145949	Dec lat:	36.04164295
Dec lon:	-114.99777083	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENENWS13 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1820.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	15		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	257	Hole depth:	257
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	254.00		1942-01-01	254.00	
1942	254		1942	254	

H39
NW
1/4 - 1/2 Mile
Lower | **NV WELLS** | **NV4000000004122**

Well log:	68381	App:	Not Reported
Notice of :	36664	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA

Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	N
Qual lith :	P		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004122		

H40
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004123**

Well log:	68382	App:	Not Reported
Notice of :	36664	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/28/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	60	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	N
Qual lith :	P		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	07/28/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004123		

H41
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004120**

Well log:	68379	App:	Not Reported
Notice of :	36665	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/04/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	57	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	57
Csng diame:	4		
Csng reduc:	0	Top perf:	31
Bottom per:	57	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	08/04/1997
Gravel p 1:	26	Gravel p 2:	57
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004120		

H42
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004121**

Well log:	68380	App:	Not Reported
Notice of :	36664	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	N
Qual lith :	P		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	0	Gravel p 2:	0

Utm x:	679787.333246
Utm y:	3990859.40573
Site id:	NV4000000004121

H43
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004126**

Well log:	68385	App:	Not Reported
Notice of :	36664	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/28/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	57	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	P
Qual lith :	N		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	07/28/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004126		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

H44
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004127**

Well log:	68386	App:	Not Reported
Notice of :	36664	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/30/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	P
Qual lith :	N		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	07/30/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004127		

H45
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004124**

Well log:	68383	App:	Not Reported
Notice of :	36664	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/31/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	N
Qual lith :	P		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	07/31/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004124		

H46
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004125**

Well log:	68384	App:	Not Reported
Notice of :	36664	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA

Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/30/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	43	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	P
Qual lith :	N		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	07/30/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004125		

H47
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004109**

Well log:	66637	App:	Not Reported
Notice of :	8118	Waiver no:	R-1005
Date log r:	12/06/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	Not Reported		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1993	Date cmplt:	M
Gravel pac:	Y	Depth seal:	7
Depth dril:	45	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	40
Csng diame:	6		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	20		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/01/1993
Gravel p 1:	9	Gravel p 2:	40
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004109		

H48
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004110**

Well log:	66638	App:	Not Reported
Notice of :	8117	Waiver no:	R-1005
Date log r:	12/06/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	Not Reported		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1993	Date cmplt:	M
Gravel pac:	Y	Depth seal:	5
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	6		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	20		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/01/1993
Gravel p 1:	8	Gravel p 2:	40
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004110		

H49
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004111**

Well log:	66639	App:	Not Reported
Notice of :	8121	Waiver no:	MO-2345
Date log r:	12/06/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	P O BOX 55 HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1993	Date cmplt:	M
Gravel pac:	Y	Depth seal:	6
Depth dril:	22	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	22
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	16		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/01/1993
Gravel p 1:	8	Gravel p 2:	22

Utm x:	679787.333246
Utm y:	3990859.40573
Site id:	NV4000000004111

H50
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004108**

Well log:	66636	App:	Not Reported
Notice of :	8119	Waiver no:	R-1005
Date log r:	12/06/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	Not Reported		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1993	Date cmplt:	M
Gravel pac:	Y	Depth seal:	6
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	38
Csng diame:	6		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	20		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/01/1993
Gravel p 1:	8	Gravel p 2:	38
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004108		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

H51
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004105**

Well log:	41473	App:	Not Reported
Notice of :	0	Waiver no:	MO-2267
Date log r:	06/07/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	KERR-MCGEE PLANT HENDERSON NV		
Owner no:	M-91		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/04/1993	Date cmplt:	D
Gravel pac:	Y	Depth seal:	11
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	30
Csng diame:	2		
Csng reduc:	0	Top perf:	14
Bottom per:	27	Perf inter:	1
Static wl:	21		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	43295		
Contract 1:	WESTERN TECHNOLOGIES INC		
Contract 2:	3611 W TOMPKINS AVE LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	CGALEJAN	Date entry:	12/17/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	05/04/1993
Gravel p 1:	13	Gravel p 2:	30
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004105		

H52
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004106**

Well log:	41474	App:	Not Reported
Notice of :	0	Waiver no:	MO-2267
Date log r:	06/07/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	KERR-MCGEE PLANT HENDERSON NV		
Owner no:	M-90		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/04/1993	Date cmplt:	D
Gravel pac:	Y	Depth seal:	12
Depth dril:	31	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	31
Csng diame:	2		
Csng reduc:	0	Top perf:	16
Bottom per:	30	Perf inter:	1
Static wl:	21		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	43295		
Contract 1:	WESTERN TECHNOLOGIES INC		
Contract 2:	3611 W TOMPKINS AVE LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	CGALEJAN	Date entry:	12/17/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	05/04/1993
Gravel p 1:	14	Gravel p 2:	30
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004106		

H53
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004107**

Well log:	66635	App:	Not Reported
Notice of :	8120	Waiver no:	R-1005
Date log r:	12/06/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA

Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	Not Reported		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1993	Date cmplt:	M
Gravel pac:	Y	Depth seal:	7
Depth dril:	39	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	39
Csng diame:	6		
Csng reduc:	0	Top perf:	9
Bottom per:	39	Perf inter:	1
Static wl:	20		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/01/1993
Gravel p 1:	9	Gravel p 2:	39
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004107		

H54
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004112**

Well log:	66640	App:	Not Reported
Notice of :	8122	Waiver no:	MO-2345
Date log r:	12/06/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	P O BOX 55 HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1993	Date cmplt:	M
Gravel pac:	Y	Depth seal:	0
Depth dril:	22	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	22
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	16		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/01/1993
Gravel p 1:	8	Gravel p 2:	22
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004112		

H55
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004117**

Well log:	68376	App:	Not Reported
Notice of :	36665	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/06/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	32
Depth dril:	69	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	69
Csng diame:	4		
Csng reduc:	0	Top perf:	35
Bottom per:	69	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	08/06/1997
Gravel p 1:	29	Gravel p 2:	69
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004117		

H56
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004118**

Well log:	68377	App:	Not Reported
Notice of :	36665	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/05/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	60	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	08/05/1997
Gravel p 1:	27	Gravel p 2:	60

Utm x:	679787.333246
Utm y:	3990859.40573
Site id:	NV4000000004118

H57
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004119**

Well log:	68378	App:	Not Reported
Notice of :	36665	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/21/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	0
Depth dril:	73	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	73
Csng diame:	4		
Csng reduc:	0	Top perf:	45
Bottom per:	73	Perf inter:	1
Static wl:	53		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	08/20/1997
Gravel p 1:	40	Gravel p 2:	73
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004119		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

H58
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004116**

Well log:	68375	App:	Not Reported
Notice of :	36665	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/18/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	25
Bottom per:	50	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	08/18/1997
Gravel p 1:	27	Gravel p 2:	50
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004116		

H59
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004113**

Well log:	66641	App:	Not Reported
Notice of :	8123	Waiver no:	MO-2345
Date log r:	12/06/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	P O BOX 55 HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1993	Date cmplt:	M
Gravel pac:	Y	Depth seal:	0
Depth dril:	20	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	20
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	16		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	11/01/1993
Gravel p 1:	7	Gravel p 2:	20
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004113		

H60
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004114**

Well log:	67043	App:	Not Reported
Notice of :	36662	Waiver no:	Not Reported
Date log r:	07/23/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA

Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/17/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	57	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	57
Csng diame:	4		
Csng reduc:	0	Top perf:	32
Bottom per:	57	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	08/11/1997
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	06/17/1997
Gravel p 1:	26	Gravel p 2:	57
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004114		

H61
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004115**

Well log:	68374	App:	Not Reported
Notice of :	36665	Waiver no:	Not Reported
Date log r:	10/07/1997	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/19/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	19
Depth dril:	45	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	45
Csng diame:	4		
Csng reduc:	0	Top perf:	20
Bottom per:	45	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	08/19/1997
Gravel p 1:	22	Gravel p 2:	45
Utm x:	679787.333246		
Utm y:	3990859.40573		
Site id:	NV4000000004115		

H62
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004094**

Well log:	89772	App:	Not Reported
Notice of :	25301	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	M-82		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/15/2003
Edit statu:	F	Well start:	06/17/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004094		

H63
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004095**

Well log:	94668	App:	Not Reported
Notice of :	22668	Waiver no:	Not Reported
Date log r:	01/11/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-008	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/07/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	18
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	20
Bottom per:	40	Perf inter:	1
Static wl:	21		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	55860		
Contract 1:	T E N V WELL & ENVIRO SERVICES		
Contract 2:	1973 N NELLIS BLVD BOX 303 LAS VEGAS NV 89115		
Contract 3:	0		
Driller li:	1953	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/12/2005
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/07/2004
Gravel p 1:	0	Gravel p 2:	0

Utm x:	679762.307515
Utm y:	3990858.89258
Site id:	NV4000000004095

H64
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004096**

Well log:	104542	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-135		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/05/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	24
Depth dril:	39	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	39
Csng diame:	2		
Csng reduc:	0	Top perf:	29
Bottom per:	39	Perf inter:	1
Static wl:	31.97		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/05/2007
Gravel p 1:	24	Gravel p 2:	39

Utm x:	679762.307515
Utm y:	3990858.89258
Site id:	NV4000000004096

H65
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004093**

Well log:	89770	App:	Not Reported
Notice of :	25299	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	57		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/07/2003
Edit statu:	F	Well start:	06/17/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004093		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

H66
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004090**

Well log:	80553	App:	Not Reported
Notice of :	21895	Waiver no:	Not Reported
Date log r:	08/11/2000	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-12-505-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/01/2000	Date cmplt:	M
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	48704		
Contract 1:	A D A COMPLIANCE CORP		
Contract 2:	3915 W HACIENDA AVE STE A-111 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	08/16/2000
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/01/2000
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004090		

H67
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004091**

Well log:	80554	App:	Not Reported
Notice of :	21945	Waiver no:	Not Reported
Date log r:	08/11/2000	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-12-505-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/07/2000	Date cmplt:	M
Gravel pac:	Y	Depth seal:	13
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2		
Csng reduc:	0	Top perf:	15
Bottom per:	35	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	48704		
Contract 1:	A D A COMPLIANCE CORP		
Contract 2:	3915 W HACIENDA AVE STE A-111 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	08/16/2000
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/07/2000
Gravel p 1:	13	Gravel p 2:	35
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004091		

H68
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004092**

Well log:	89768	App:	Not Reported
Notice of :	25299	Waiver no:	Not Reported
Date log r:	07/01/2003	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA

Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	M-27		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/07/2003
Update use:	DBRANTLEY	Date updat:	07/07/2003
Edit statu:	F	Well start:	06/17/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004092		

H69
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004097**

Well log:	104543	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-131		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	40	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	30
Bottom per:	40	Perf inter:	1
Static wl:	30.03		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/06/2007
Gravel p 1:	25	Gravel p 2:	40
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004097		

H70
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004102**

Well log:	104548	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	AA-MW-16		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/10/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	40	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	25
Bottom per:	40	Perf inter:	1
Static wl:	37.23		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/09/2007
Gravel p 1:	20	Gravel p 2:	40
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004102		

H71
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004103**

Well log:	104551	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-134		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/05/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	55
Depth dril:	70	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	70
Csng diame:	2		
Csng reduc:	0	Top perf:	60
Bottom per:	70	Perf inter:	1
Static wl:	31.73		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/05/2007
Gravel p 1:	55	Gravel p 2:	70
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004103		

H72
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004104**

Well log:	109482	App:	Not Reported
Notice of :	34499	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	WARM SPRING RD & E OF 4TH ST		
Owner no:	I-AB		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/14/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	50	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	50
Csng diame:	6.625		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	30		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/17/2009
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	08/14/2009
Gravel p 1:	20	Gravel p 2:	50
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004104		

H73
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004101**

Well log:	104547	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	MW-111A		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/10/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	20
Bottom per:	40	Perf inter:	1
Static wl:	35.07		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/09/2007
Gravel p 1:	25	Gravel p 2:	40
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004101		

H74
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004098**

Well log:	104544	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	I-AA		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	19
Depth dril:	47	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	47
Csng diame:	6		
Csng reduc:	0	Top perf:	24
Bottom per:	44	Perf inter:	1
Static wl:	30.41		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/06/2007
Gravel p 1:	19	Gravel p 2:	44
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004098		

H75
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004099**

Well log:	104545	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	MW-126		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	50
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2		
Csng reduc:	0	Top perf:	20
Bottom per:	40	Perf inter:	1
Static wl:	35.65		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/06/2007
Gravel p 1:	15	Gravel p 2:	40
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004099		

H76
NW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004100**

Well log:	104546	App:	Not Reported
Notice of :	33005	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	MW-136		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/07/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	75
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	90
Csng diame:	2		
Csng reduc:	0	Top perf:	80
Bottom per:	90	Perf inter:	1
Static wl:	27.42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	07/15/2003
Edit statu:	F	Well start:	12/07/2007
Gravel p 1:	75	Gravel p 2:	90
Utm x:	679762.307515		
Utm y:	3990858.89258		
Site id:	NV4000000004100		

I77
South
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003586**

Well log:	109485	App:	Not Reported
Notice of :	34496	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	N OF LAKE MEAD PKWY & E OF 4TH ST		
Owner no:	M-139		
Parcel no:	178-13-501-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/28/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2.375		
Csng reduc:	0	Top perf:	45
Bottom per:	60	Perf inter:	1
Static wl:	24		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/17/2009
Update use:	Not Reported	Date updat:	03/10/1997
Edit statu:	F	Well start:	08/28/2009
Gravel p 1:	40	Gravel p 2:	60
Utm x:	680179.814976		
Utm y:	3990035.10968		
Site id:	NV4000000003586		

J78
SSW
1/4 - 1/2 Mile
Higher

FED USGS **USGS3088803**

Agency cd:	USGS	Site no:	360227115001201
Site name:	212 S22 E62 13BAAC1 BMI		
Latitude:	360226	EDR Site id:	USGS3088803
Longitude:	1150013	Dec lat:	36.04053175
Dec lon:	-115.00443765	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNENES13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	206	Hole depth:	206
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	198.00		1942-01-01	198.00	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942	198		1942	198	

79
ESE
1/4 - 1/2 Mile
Higher

FED USGS **USGS3088810**

Agency cd:	USGS	Site no:	360231114594401
Site name:	212 S22 E62 13AABA2 BMI		
Latitude:	360231	EDR Site id:	USGS3088810
Longitude:	1145944	Dec lat:	36.04192074
Dec lon:	-114.9963819	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENENWS13 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1820.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	15		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	254	Hole depth:	254
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	248.00		1942-01-01	248.00	
1942	248		1942	248	

I80
South
1/4 - 1/2 Mile
Higher

FED USGS **USGS3088801**

Agency cd:	USGS	Site no:	360223115000401
Site name:	212 S22 E62 13ABCB1 BMI		
Latitude:	360223	EDR Site id:	USGS3088801
Longitude:	1150004	Dec lat:	36.03969848
Dec lon:	-115.00193757	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENWSWS13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1828.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	170	Hole depth:	170
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 4

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	131.00		1942-01-01	131.00	
1942	131		1942	131	

K81
NE
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004138**

Well log:	98869	App:	Not Reported
Notice of :	28674	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DA

Legal quar:	NE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-701-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/08/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	24
Depth dril:	57	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	46
Csng diame:	4		
Csng reduc:	0	Top perf:	24
Bottom per:	46	Perf inter:	1
Static wl:	31.45		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/30/2006
Update use:	DBRANTLEY	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/08/2005
Gravel p 1:	24	Gravel p 2:	46
Utm x:	680563.131565		
Utm y:	3990875.34903		
Site id:	NV4000000004138		

K82
NE
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004139**

Well log:	98870	App:	Not Reported
Notice of :	28675	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	DA

Legal quar:	NE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-701-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/08/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	24
Depth dril:	57	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	46
Csng diame:	4		
Csng reduc:	0	Top perf:	26
Bottom per:	46	Perf inter:	1
Static wl:	34.07		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/30/2006
Update use:	DBRANTLEY	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/08/2005
Gravel p 1:	24	Gravel p 2:	46
Utm x:	680563.131565		
Utm y:	3990875.34903		
Site id:	NV4000000004139		

J83
SW
1/4 - 1/2 Mile
Higher

FED USGS USGS3100075

Agency cd:	USGS	Site no:	360227115001701
Site name:	212 S22 E62 13BABD1 BMI		
Latitude:	360227	EDR Site id:	USGS3100075
Longitude:	1150017	Dec lat:	36.04080951
Dec lon:	-115.00554879	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNENWS13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	182.	Hole depth:	182.
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1942-05-12	83	

J84
SW
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003647**

Well log:	102998	App:	Not Reported
Notice of :	30692	Waiver no:	Not Reported
Date log r:	06/15/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	HOLT, JOHN		
Owner addr:	P O BOX 6457 PHOENIX AZ		
Owner no:	B-007		
Parcel no:	178-13-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	49
Csng diame:	2		
Csng reduc:	0	Top perf:	39
Bottom per:	49	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/2007
Update use:	DBRANTLEY	Date updat:	11/30/2007
Edit statu:	F	Well start:	06/06/2007
Gravel p 1:	37	Gravel p 2:	50
Utm x:	679778.733377		
Utm y:	3990057.70615		
Site id:	NV4000000003647		

J85
SW
1/4 - 1/2 Mile Higher

NV WELLS **NV4000000003646**

Well log:	77673	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-08		
Parcel no:	178-13-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/30/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	55
Depth dril:	93	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	98
Csng diame:	4.5		
Csng reduc:	0	Top perf:	63
Bottom per:	93	Perf inter:	1
Static wl:	52.8		
Temperatur:	0		
Yield:	10		
Drawdown:	0		
Hours pump:	.75		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	DSDAVIS	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/29/1999
Gravel p 1:	55	Gravel p 2:	98

Utm x:	679778.733377
Utm y:	3990057.70615
Site id:	NV4000000003646

J86
SW
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003645**

Well log:	77672	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-07		
Parcel no:	178-13-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/30/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	252
Depth dril:	290	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	292
Csng diame:	4.5		
Csng reduc:	0	Top perf:	260
Bottom per:	290	Perf inter:	1
Static wl:	39.5		
Temperatur:	0		
Yield:	11		
Drawdown:	0		
Hours pump:	.75		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	DSDAVIS	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/25/1999
Gravel p 1:	252	Gravel p 2:	292
Utm x:	679778.733377		
Utm y:	3990057.70615		
Site id:	NV4000000003645		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

J87
SW
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003648**

Well log:	102999	App:	Not Reported
Notice of :	30692	Waiver no:	Not Reported
Date log r:	06/15/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	HOLT, JOHN		
Owner addr:	P O BOX 6457 PHOENIX AZ		
Owner no:	B-48		
Parcel no:	178-13-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	47
Csng diame:	2		
Csng reduc:	0	Top perf:	37
Bottom per:	47	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/2007
Update use:	DBRANTLEY	Date updat:	11/30/2007
Edit statu:	F	Well start:	06/06/2007
Gravel p 1:	35	Gravel p 2:	50
Utm x:	679778.733377		
Utm y:	3990057.70615		
Site id:	NV4000000003648		

J88
SW
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003651**

Well log:	109142	App:	Not Reported
Notice of :	34491	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	N OF LAKE MEAD & E OF 4TH ST		
Owner no:	M-144		
Parcel no:	178-13-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/10/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2.375		
Csng reduc:	0	Top perf:	35
Bottom per:	45	Perf inter:	1
Static wl:	37		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	11/30/2007
Edit statu:	F	Well start:	09/08/2009
Gravel p 1:	30	Gravel p 2:	45
Utm x:	679778.733377		
Utm y:	3990057.70615		
Site id:	NV4000000003651		

J89
SW
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003650**

Well log:	109141	App:	Not Reported
Notice of :	34491	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BA

Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	N OF LAKE MEAD & E OF 4TH ST		
Owner no:	M-146		
Parcel no:	178-13-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/04/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.375		
Csng reduc:	0	Top perf:	40
Bottom per:	50	Perf inter:	1
Static wl:	34		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	11/30/2007
Edit statu:	F	Well start:	09/01/2009
Gravel p 1:	35	Gravel p 2:	50
Utm x:	679778.733377		
Utm y:	3990057.70615		
Site id:	NV4000000003650		

J90
SW
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003649**

Well log:	103000	App:	Not Reported
Notice of :	30692	Waiver no:	Not Reported
Date log r:	06/15/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	HOLT, JOHN		
Owner addr:	P O BOX 6457 PHOENIX AZ		
Owner no:	B-62		
Parcel no:	178-13-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	50	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	49
Csng diame:	2		
Csng reduc:	0	Top perf:	39
Bottom per:	49	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/2007
Update use:	DBRANTLEY	Date updat:	11/30/2007
Edit statu:	F	Well start:	06/06/2007
Gravel p 1:	37	Gravel p 2:	50
Utm x:	679778.733377		
Utm y:	3990057.70615		
Site id:	NV4000000003649		

91
ESE
1/4 - 1/2 Mile
Higher

FED USGS **USGS3088821**

Agency cd:	USGS	Site no:	360236114593701
Site name:	212 S22 E62 12DDDA1 BMI		
Latitude:	360236	EDR Site id:	USGS3088821
Longitude:	1145937	Dec lat:	36.04330963
Dec lon:	-114.99443743	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESESES12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	230	Hole depth:	230
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1942-05-12	0.00	

L92
ESE **FED USGS** **USGS3088809**
1/4 - 1/2 Mile
Higher

Agency cd:	USGS	Site no:	360231114593901
Site name:	212 S22 E62 13AAAB1 BMI		
Latitude:	360231	EDR Site id:	USGS3088809
Longitude:	1145939	Dec lat:	36.04192076
Dec lon:	-114.99499296	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENENES13 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1820.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	15		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	266	Hole depth:	266
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

93
WSW **FED USGS** **USGS3100080**
1/4 - 1/2 Mile
Higher

Agency cd:	USGS	Site no:	360229115002301
Site name:	212 S22 E62 13BBAD1 BMI		
Latitude:	360229	EDR Site id:	USGS3100080
Longitude:	1150023	Dec lat:	36.04136502
Dec lon:	-115.00721552	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNWNES13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1810.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	206	Hole depth:	206
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1942-05-12	130	

94
SSW
1/4 - 1/2 Mile
Higher

FED USGS USGS3100069

Agency cd:	USGS	Site no:	360222115001601
Site name:	212 S22 E62 13BACA1 BMI		
Latitude:	360222	EDR Site id:	USGS3100069
Longitude:	1150016	Dec lat:	36.03942066
Dec lon:	-115.00527096	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNESWS13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1827.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	156
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1942-05-12	89	

95
SE
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003587**

Well log:	36559	App:	Not Reported
Notice of :	8461	Waiver no:	MO-2115
Date log r:	02/14/1992	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	Not Reported		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/13/1991	Date cmplt:	D
Gravel pac:	Y	Depth seal:	26
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2		
Csng reduc:	0	Top perf:	30
Bottom per:	60	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	RICHARD LEBLANC		
Contract 2:	4670 S POLARIS LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	12/17/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	12/13/1991
Gravel p 1:	26	Gravel p 2:	60
Utm x:	680605.293356		
Utm y:	3990043.86176		
Site id:	NV4000000003587		

L96
ESE **FED USGS** **USGS3088812**
1/4 - 1/2 Mile
Higher

Agency cd:	USGS	Site no:	360232114593501
Site name:	212 S22 E63 07CCCC1 BMI		
Latitude:	360232	EDR Site id:	USGS3088812
Longitude:	1145935	Dec lat:	36.04219855
Dec lon:	-114.99388182	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSWSWS07 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1818.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	15		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	305	Hole depth:	305
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-00-00	Ground water data end date:	1942-01-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1942-01-01	300.00		1942	300	

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

M97
SSE
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003560**

Well log:	102996	App:	Not Reported
Notice of :	30693	Waiver no:	Not Reported
Date log r:	06/15/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	A
Legal quar:	NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	HOLT, JOHN		
Owner addr:	P O BOX 6457 PHOENIX AZ		
Owner no:	Not Reported		
Parcel no:	178-13-501-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	49
Csng diame:	2		
Csng reduc:	0	Top perf:	39
Bottom per:	49	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/2007
Update use:	Not Reported	Date updat:	02/17/2006
Edit statu:	F	Well start:	06/06/2007
Gravel p 1:	37	Gravel p 2:	50
Utm x:	680383.842877		
Utm y:	3989854.33646		
Site id:	NV4000000003560		

M98
SSE
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003561**

Well log:	102997	App:	Not Reported
Notice of :	30691	Waiver no:	Not Reported
Date log r:	06/15/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	A
Legal quar:	NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	HOLT, JOHN		
Owner addr:	P O BOX 6457 PHOENIX AZ		
Owner no:	Not Reported		
Parcel no:	178-13-501-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/08/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	54	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	52
Csng diame:	2		
Csng reduc:	0	Top perf:	37
Bottom per:	52	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/2007
Update use:	Not Reported	Date updat:	02/17/2006
Edit statu:	F	Well start:	06/07/2007
Gravel p 1:	35	Gravel p 2:	54
Utm x:	680383.842877		
Utm y:	3989854.33646		
Site id:	NV4000000003561		

N99
North
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004406**

Well log:	84376	App:	Not Reported
Notice of :	22000	Waiver no:	Not Reported
Date log r:	10/29/2001	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AC

Legal quar:	SW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	M-110		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/09/2001	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	30
Bottom per:	40	Perf inter:	1
Static wl:	33		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	10/31/2001
Update use:	DBRANTLEY	Date updat:	10/31/2001
Edit statu:	F	Well start:	10/09/2001
Gravel p 1:	28	Gravel p 2:	40
Utm x:	680154.487051		
Utm y:	3991267.70552		
Site id:	NV4000000004406		

N100
North
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004405**

Well log:	84375	App:	Not Reported
Notice of :	22000	Waiver no:	Not Reported
Date log r:	10/29/2001	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AC
Legal quar:	SW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	M-111		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/09/2001	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	40	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	30
Bottom per:	40	Perf inter:	1
Static wl:	33.5		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	10/31/2001
Update use:	DBRANTLEY	Date updat:	10/31/2001
Edit statu:	F	Well start:	10/09/2001
Gravel p 1:	28	Gravel p 2:	40
Utm x:	680154.487051		
Utm y:	3991267.70552		
Site id:	NV4000000004405		

N101
North
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004407**

Well log:	98846	App:	Not Reported
Notice of :	26239	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AC
Legal quar:	SW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/06/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	17
Depth dril:	47	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	39
Csng diame:	4		
Csng reduc:	0	Top perf:	19
Bottom per:	39	Perf inter:	1
Static wl:	30.02		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2006
Update use:	Not Reported	Date updat:	10/31/2001
Edit statu:	F	Well start:	12/06/2005
Gravel p 1:	17	Gravel p 2:	39
Utm x:	680154.487051		
Utm y:	3991267.70552		
Site id:	NV4000000004407		

N102
North
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004409**

Well log:	104550	App:	Not Reported
Notice of :	33004	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AC
Legal quar:	SW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	P O BOX 268859 OKLAHOMA CITY OK		
Owner no:	M-133		
Parcel no:	178-12-601-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/13/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	55
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	2		
Csng reduc:	0	Top perf:	60
Bottom per:	70	Perf inter:	1
Static wl:	28.98		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	10/31/2001
Edit statu:	F	Well start:	12/12/2007
Gravel p 1:	55	Gravel p 2:	70

Utm x:	680154.487051
Utm y:	3991267.70552
Site id:	NV4000000004409

N103
North
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004408**

Well log:	104549	App:	Not Reported
Notice of :	33004	Waiver no:	Not Reported
Date log r:	01/03/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AC
Legal quar:	SW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	P O BOX 268859 OKLAHOMA CITY OK		
Owner no:	M-132		
Parcel no:	178-12-601-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/12/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	75
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	90
Csng diame:	2		
Csng reduc:	0	Top perf:	80
Bottom per:	90	Perf inter:	1
Static wl:	27.82		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/16/2008
Update use:	Not Reported	Date updat:	10/31/2001
Edit statu:	F	Well start:	12/11/2007
Gravel p 1:	75	Gravel p 2:	90

Utm x:	680154.487051
Utm y:	3991267.70552
Site id:	NV4000000004408

O104
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003852**

Well log:	37008	App:	Not Reported
Notice of :	2743	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-069		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/19/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	44
Bottom per:	54	Perf inter:	1
Static wl:	47		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/19/1989
Gravel p 1:	39	Gravel p 2:	60
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003852		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

O105
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003851**

Well log:	37007	App:	Not Reported
Notice of :	2742	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-068		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/19/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	34
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	4		
Csng reduc:	0	Top perf:	39
Bottom per:	49	Perf inter:	1
Static wl:	46		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/19/1989
Gravel p 1:	34	Gravel p 2:	55
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003851		

O106
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003854**

Well log:	37010	App:	Not Reported
Notice of :	2745	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-060		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/09/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	44
Bottom per:	54	Perf inter:	1
Static wl:	50		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/09/1989
Gravel p 1:	40	Gravel p 2:	60
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003854		

O107
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003853**

Well log:	37009	App:	Not Reported
Notice of :	2744	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC

Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-072		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/24/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	44
Bottom per:	54	Perf inter:	1
Static wl:	54		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/24/1989
Gravel p 1:	39	Gravel p 2:	60
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003853		

O108
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003848**

Well log:	37004	App:	Not Reported
Notice of :	2739	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-071		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/24/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	34
Depth dril:	55	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	55
Csng diame:	4		
Csng reduc:	0	Top perf:	39
Bottom per:	49	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/24/1989
Gravel p 1:	34	Gravel p 2:	55
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003848		

O109
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003847**

Well log:	33909	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	08/02/1990	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	SAGAURRO POWER COMPANY		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/01/1990	Date cmplt:	M
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	28363		
Contract 1:	ENVIRONMENTAL WEST EXPLORATION		
Contract 2:	P O BOX 11095 SPOKANE WA 99211		
Contract 3:	1712		
Driller li:	1712	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	06/01/1990
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003847		

O110
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003850**

Well log:	37006	App:	Not Reported
Notice of :	2741	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-067		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/16/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	44
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	49
Bottom per:	59	Perf inter:	1
Static wl:	45		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/16/1989
Gravel p 1:	44	Gravel p 2:	65

Utm x:	679395.117823
Utm y:	3990450.61081
Site id:	NV4000000003850

O111
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003849**

Well log:	37005	App:	Not Reported
Notice of :	2740	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-070		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/23/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	44
Bottom per:	54	Perf inter:	1
Static wl:	46		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/23/1989
Gravel p 1:	39	Gravel p 2:	60
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003849		

Map ID Direction Distance Elevation			Database	EDR ID Number
O112 **West** **1/4 - 1/2 Mile** **Higher**			**NV WELLS**	**NV4000000003855**

Well log:	37011	App:	Not Reported
Notice of :	2746	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-059		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/09/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	44
Bottom per:	54	Perf inter:	1
Static wl:	50		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/09/1989
Gravel p 1:	39	Gravel p 2:	60
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003855		

O113 **West** **1/4 - 1/2 Mile** **Higher**		**NV WELLS**	**NV4000000003861**

Well log:	75456	App:	Not Reported
Notice of :	18209	Waiver no:	Not Reported
Date log r:	12/17/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKLAI CO		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/12/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	50
Depth dril:	75	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	75
Csng diame:	4		
Csng reduc:	0	Top perf:	55
Bottom per:	75	Perf inter:	1
Static wl:	58		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/15/1999
Update use:	Not Reported	Date updat:	09/28/1999
Edit statu:	F	Well start:	11/12/1998
Gravel p 1:	50	Gravel p 2:	75
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003861		

O114
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003860**

Well log:	75455	App:	Not Reported
Notice of :	18210	Waiver no:	Not Reported
Date log r:	12/17/1998	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC

Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/13/1998	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	75	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/15/1999
Update use:	DSDAVIS	Date updat:	09/28/1999
Edit statu:	F	Well start:	11/13/1998
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003860		

O115
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003863**

Well log:	75642	App:	Not Reported
Notice of :	18210	Waiver no:	Not Reported
Date log r:	01/15/1999	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/13/1998	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	75	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/21/1999
Update use:	Not Reported	Date updat:	09/28/1999
Edit statu:	F	Well start:	11/13/1998
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003863		

O116
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003862**

Well log:	75641	App:	Not Reported
Notice of :	18209	Waiver no:	Not Reported
Date log r:	01/15/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKLAI CO		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/12/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	50
Depth dril:	75	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	75
Csng diame:	4		
Csng reduc:	0	Top perf:	55
Bottom per:	75	Perf inter:	1
Static wl:	58		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/21/1999
Update use:	Not Reported	Date updat:	09/28/1999
Edit statu:	F	Well start:	11/12/1998
Gravel p 1:	50	Gravel p 2:	75
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003862		

O117
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003857**

Well log:	37013	App:	Not Reported
Notice of :	2748	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-061		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/10/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	33
Bottom per:	43	Perf inter:	1
Static wl:	44		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/10/1989
Gravel p 1:	28	Gravel p 2:	50

Utm x:	679395.117823
Utm y:	3990450.61081
Site id:	NV4000000003857

O118
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003856**

Well log:	37012	App:	Not Reported
Notice of :	2747	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-064		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/12/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	34
Bottom per:	44	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/12/1989
Gravel p 1:	28	Gravel p 2:	50
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003856		

Map ID Direction Distance Elevation		Database	EDR ID Number
O119 **West** **1/4 - 1/2 Mile** **Higher**		**NV WELLS**	**NV4000000003859**

Well log:	41476	App:	Not Reported
Notice of :	0	Waiver no:	MO-2267
Date log r:	06/07/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	KERR-MCGEE PLANT HENDERSON NV		
Owner no:	M-93		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/05/1993	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	46	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	46
Csng diame:	2		
Csng reduc:	0	Top perf:	36
Bottom per:	46	Perf inter:	1
Static wl:	33		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	43295		
Contract 1:	WESTERN TECHNOLOGIES INC		
Contract 2:	3611 W TOMPKINS AVE LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	CGALEJAN	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	05/05/1993
Gravel p 1:	32	Gravel p 2:	46
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003859		

O120 **West** **1/4 - 1/2 Mile** **Higher**		**NV WELLS**	**NV4000000003858**

Well log:	41475	App:	Not Reported
Notice of :	0	Waiver no:	MO-2267
Date log r:	05/07/1993	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	KERR-MCGEE PLANT HENDERSON NV		
Owner no:	M-92		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/05/1993	Date cmplt:	D
Gravel pac:	Y	Depth seal:	29
Depth dril:	46	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	46
Csng diame:	2		
Csng reduc:	0	Top perf:	35
Bottom per:	45	Perf inter:	1
Static wl:	35		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	43295		
Contract 1:	WESTERN TECHNOLOGIES INC		
Contract 2:	3611 W TOMPKINS AVE LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	CGALEJAN	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	05/04/1993
Gravel p 1:	31	Gravel p 2:	45
Utm x:	679395.117823		
Utm y:	3990450.61081		
Site id:	NV4000000003858		

121
East
1/4 - 1/2 Mile
Higher

FED USGS **USGS3088820**

Agency cd:	USGS	Site no:	360236114593201
Site name:	212 S22 E63 07CCCA1 BMI		
Latitude:	360236	EDR Site id:	USGS3088820
Longitude:	1145932	Dec lat:	36.04330965
Dec lon:	-114.99304849	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSWSWS07 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1811.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	230	Hole depth:	230
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1942-05-12	164	

O122
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003839**

Well log:	76544	App:	Not Reported
Notice of :	18658	Waiver no:	Not Reported
Date log r:	08/20/1999	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	U	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC

Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/28/1999	Date cmplt:	D
Gravel pac:	N	Depth seal:	0
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	65	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2129	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/27/1999
Update use:	Not Reported	Date updat:	09/21/1999
Edit statu:	F	Well start:	07/28/1999
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003839		

O123
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003840**

Well log:	77677	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-11		
Parcel no:	178-12-101-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/15/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	262
Depth dril:	293	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	292
Csng diame:	4.5		
Csng reduc:	0	Top perf:	272
Bottom per:	292	Perf inter:	1
Static wl:	5.1		
Temperatur:	0		
Yield:	1		
Drawdown:	0		
Hours pump:	1		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	DSDAVIS	Date updat:	01/07/2000
Edit statu:	F	Well start:	10/13/1999
Gravel p 1:	262	Gravel p 2:	293
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003840		

O124
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003838**

Well log:	76433	App:	Not Reported
Notice of :	19681	Waiver no:	Not Reported
Date log r:	09/17/1999	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/18/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	60	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2129	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/23/1999
Update use:	Not Reported	Date updat:	09/21/1999
Edit statu:	F	Well start:	08/18/1999
Gravel p 1:	28	Gravel p 2:	60
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003838		

O125
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003836**

Well log:	76426	App:	Not Reported
Notice of :	18658	Waiver no:	Not Reported
Date log r:	08/20/1999	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/28/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	65	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2129	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/21/1999
Update use:	DSDAVIS	Date updat:	09/21/1999
Edit statu:	F	Well start:	07/28/1999
Gravel p 1:	28	Gravel p 2:	65

Utm x:	679370.090968
Utm y:	3990450.09882
Site id:	NV4000000003836

O126
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003837**

Well log:	76432	App:	Not Reported
Notice of :	19682	Waiver no:	Not Reported
Date log r:	09/17/1999	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	U	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-501-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/18/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	60	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2129	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/23/1999
Update use:	Not Reported	Date updat:	09/21/1999
Edit statu:	F	Well start:	08/18/1999
Gravel p 1:	28	Gravel p 2:	60
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003837		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

O127
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003841**

Well log:	86645	App:	Not Reported
Notice of :	21218	Waiver no:	Not Reported
Date log r:	06/27/2002	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-201-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/20/2000	Date cmplt:	D
Gravel pac:	Y	Depth seal:	7
Depth dril:	47	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	47
Csng diame:	2		
Csng reduc:	0	Top perf:	7
Bottom per:	47	Perf inter:	1
Static wl:	0		
Temperatur:	78		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	19101		
Contract 1:	LAYNE CHRISTENSEN CO		
Contract 2:	12030 E RIGGS RD CHANDLER AZ 85249		
Contract 3:	0		
Driller li:	2021	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/04/2002
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	03/20/2000
Gravel p 1:	7	Gravel p 2:	47
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003841		

O128
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003845**

Well log:	107353	App:	Not Reported
Notice of :	33714	Waiver no:	Not Reported
Date log r:	11/12/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-128		
Parcel no:	178-12-401-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/27/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	38
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	55	Perf inter:	1
Static wl:	37.12		
Temperatur:	0		
Yield:	.5		
Drawdown:	1.22		
Hours pump:	4		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2313	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/20/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	06/27/2008
Gravel p 1:	38	Gravel p 2:	55
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003845		

O129
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003846**

Well log:	108492	App:	Not Reported
Notice of :	60944	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	S OF WARM SPRINGS RD & E OF EASTGATE RD		
Owner no:	Not Reported		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/15/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	0
Depth dril:	75	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	67
Csng diame:	4.5		
Csng reduc:	0	Top perf:	44
Bottom per:	64	Perf inter:	1
Static wl:	54		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=ROTOSONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	DBRANTLEY	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/30/2009
Gravel p 1:	41	Gravel p 2:	65
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003846		

O130
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003844**

Well log:	107352	App:	Not Reported
Notice of :	33714	Waiver no:	Not Reported
Date log r:	11/12/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-123		
Parcel no:	178-12-401-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/29/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	34
Depth dril:	51	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	51
Csng diame:	2		
Csng reduc:	0	Top perf:	36
Bottom per:	51	Perf inter:	1
Static wl:	42.32		
Temperatur:	0		
Yield:	.5		
Drawdown:	1.5		
Hours pump:	4		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2313	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/20/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	06/28/2008
Gravel p 1:	34	Gravel p 2:	51
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003844		

O131
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003842**

Well log:	107350	App:	Not Reported
Notice of :	33717	Waiver no:	Not Reported
Date log r:	11/12/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-142		
Parcel no:	178-12-401-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/25/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2		
Csng reduc:	0	Top perf:	30
Bottom per:	45	Perf inter:	1
Static wl:	31.25		
Temperatur:	0		
Yield:	.5		
Drawdown:	.73		
Hours pump:	4		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2313	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/20/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	06/25/2008
Gravel p 1:	28	Gravel p 2:	45
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003842		

O132
West
1/4 - 1/2 Mile
Higher

NV WELLS **NV4000000003843**

Well log:	107351	App:	Not Reported
Notice of :	33715	Waiver no:	Not Reported
Date log r:	11/12/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CC

Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-124		
Parcel no:	178-12-401-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/28/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	32
Depth dril:	49	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	49
Csng diame:	2		
Csng reduc:	0	Top perf:	34
Bottom per:	49	Perf inter:	1
Static wl:	37.35		
Temperatur:	0		
Yield:	.5		
Drawdown:	2.05		
Hours pump:	4		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2313	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/20/2009
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	06/28/2008
Gravel p 1:	32	Gravel p 2:	49
Utm x:	679370.090968		
Utm y:	3990450.09882		
Site id:	NV4000000003843		

P133
NNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004401**

Well log:	49518	App:	Not Reported
Notice of :	16126	Waiver no:	MO-2610
Date log r:	01/09/1996	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BD

Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/29/1995	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	3		
Csng reduc:	0	Top perf:	25
Bottom per:	35	Perf inter:	1
Static wl:	27		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	290	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/25/1996
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/29/1995
Gravel p 1:	20	Gravel p 2:	35
Utm x:	679779.118097		
Utm y:	3991259.99929		
Site id:	NV4000000004401		

P134
NNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004400**

Well log:	49517	App:	Not Reported
Notice of :	16125	Waiver no:	MO-2610
Date log r:	01/09/1996	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/24/1995	Date cmplt:	D
Gravel pac:	Y	Depth seal:	15
Depth dril:	40	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	40
Csng diame:	3		
Csng reduc:	0	Top perf:	30
Bottom per:	40	Perf inter:	1
Static wl:	33		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	290	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/25/1996
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/23/1995
Gravel p 1:	15	Gravel p 2:	40
Utm x:	679779.118097		
Utm y:	3991259.99929		
Site id:	NV4000000004400		

P135
NNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004402**

Well log:	49644	App:	Not Reported
Notice of :	16126	Waiver no:	MO-2610
Date log r:	01/19/1996	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	MW-05		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/28/1995	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	3		
Csng reduc:	0	Top perf:	0
Bottom per:	50	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	0		
Driller li:	290	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/29/1996
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/25/1995
Gravel p 1:	35	Gravel p 2:	50
Utm x:	679779.118097		
Utm y:	3991259.99929		
Site id:	NV4000000004402		

P136
NNW **NV WELLS** **NV4000000004404**
1/4 - 1/2 Mile
Lower

Well log:	71384	App:	Not Reported
Notice of :	17416	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	MW-02		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/13/1998	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/28/1998
Update use:	user15	Date updat:	06/04/1998
Edit statu:	F	Well start:	04/13/1998
Gravel p 1:	0	Gravel p 2:	0

Utm x:	679779.118097
Utm y:	3991259.99929
Site id:	NV4000000004404

P137
NNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004403**

Well log:	71383	App:	Not Reported
Notice of :	17416	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	MW-01		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/13/1998	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/28/1998
Update use:	user15	Date updat:	06/04/1998
Edit statu:	F	Well start:	04/13/1998
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679779.118097		
Utm y:	3991259.99929		
Site id:	NV4000000004403		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

Q138
WNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004087**

Well log:	37001	App:	Not Reported
Notice of :	2751	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-065		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/30/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	58
Depth dril:	80	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	80
Csng diame:	4		
Csng reduc:	0	Top perf:	63
Bottom per:	73	Perf inter:	1
Static wl:	60		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/13/1989
Gravel p 1:	58	Gravel p 2:	80
Utm x:	679386.921703		
Utm y:	3990851.20382		
Site id:	NV4000000004087		

Q139
WNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004086**

Well log:	37000	App:	Not Reported
Notice of :	2749	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-066		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/16/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	43
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	48
Bottom per:	58	Perf inter:	1
Static wl:	47		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/16/1989
Gravel p 1:	43	Gravel p 2:	65
Utm x:	679386.921703		
Utm y:	3990851.20382		
Site id:	NV4000000004086		

Q140
WNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004089**

Well log:	37003	App:	Not Reported
Notice of :	2750	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB

Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-062		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/13/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	44
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	49
Bottom per:	59	Perf inter:	1
Static wl:	49		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/13/1989
Gravel p 1:	44	Gravel p 2:	65
Utm x:	679386.921703		
Utm y:	3990851.20382		
Site id:	NV4000000004089		

Q141
WNW
1/4 - 1/2 Mile
Lower

NV WELLS **NV4000000004088**

Well log:	37002	App:	Not Reported
Notice of :	2752	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-063		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/11/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	44
Depth dril:	65	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	49
Bottom per:	59	Perf inter:	1
Static wl:	58		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/11/1989
Gravel p 1:	44	Gravel p 2:	65
Utm x:	679386.921703		
Utm y:	3990851.20382		
Site id:	NV4000000004088		

Q142
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004074**

Well log:	85396	App:	Not Reported
Notice of :	22941	Waiver no:	Not Reported
Date log r:	02/13/2002	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICA		
Owner addr:	8000 LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/13/2002	Date cmplt:	D
Gravel pac:	Y	Depth seal:	51
Depth dril:	68	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	68
Csng diame:	4		
Csng reduc:	0	Top perf:	53
Bottom per:	68	Perf inter:	1
Static wl:	55		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	47851		
Contract 1:	M C C S		
Contract 2:	6440 SKY POINTE DR, STE 140 LAS VEGAS, NV 89131		
Contract 3:	0		
Driller li:	2044	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/27/2002
Update use:	Not Reported	Date updat:	07/18/2001
Edit statu:	F	Well start:	01/13/2002
Gravel p 1:	51	Gravel p 2:	68
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004074		

Q143
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004073**

Well log:	83206	App:	Not Reported
Notice of :	20467	Waiver no:	R-1061
Date log r:	06/18/2001	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/08/2001	Date cmplt:	D
Gravel pac:	Y	Depth seal:	27
Depth dril:	58	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	58
Csng diame:	6		
Csng reduc:	0	Top perf:	29
Bottom per:	54	Perf inter:	1
Static wl:	47		
Temperatur:	0		
Yield:	3		
Drawdown:	0		
Hours pump:	0		
Test metho:	P	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7560 W SAHARA AVE STE 101 LAS VEGAS NV 89117		
Contract 3:	0		
Driller li:	2107	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/05/2001
Update use:	DBRANTLEY	Date updat:	07/18/2001
Edit statu:	F	Well start:	06/08/2001
Gravel p 1:	27	Gravel p 2:	54

Utm x:	679361.895993
Utm y:	3990850.69181
Site id:	NV4000000004073

Q144
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004076**

Well log:	94260	App:	Not Reported
Notice of :	26211	Waiver no:	Not Reported
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	01		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/15/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	59	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	59
Csng diame:	4		
Csng reduc:	0	Top perf:	25
Bottom per:	59	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	11/22/2002
Edit statu:	F	Well start:	07/09/2004
Gravel p 1:	23	Gravel p 2:	59
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004076		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

Q145
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004075**

Well log:	86825	App:	Not Reported
Notice of :	20468	Waiver no:	Not Reported
Date log r:	05/17/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/02/2001	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	48	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	8		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7560 W SAHARA AVE STE 101 LAS VEGAS NV 89117		
Contract 3:	0		
Driller li:	2173	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/13/2002
Update use:	DBRANTLEY	Date updat:	11/22/2002
Edit statu:	F	Well start:	05/02/2001
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004075		

Q146
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004070**

Well log:	77679	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-02		
Parcel no:	178-12-401-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/09/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	138
Depth dril:	180	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	174
Csng diame:	4.5		
Csng reduc:	0	Top perf:	144
Bottom per:	174	Perf inter:	1
Static wl:	30.1		
Temperatur:	0		
Yield:	1		
Drawdown:	0		
Hours pump:	.75		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	DSDAVIS	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/08/1999
Gravel p 1:	138	Gravel p 2:	180
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004070		

Q147
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004069**

Well log:	77678	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB

Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-11		
Parcel no:	178-12-401-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/03/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	270
Depth dril:	312	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	312
Csng diame:	4.5		
Csng reduc:	0	Top perf:	282
Bottom per:	311	Perf inter:	1
Static wl:	4.2		
Temperatur:	0		
Yield:	5		
Drawdown:	0		
Hours pump:	.5		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	Not Reported	Date updat:	02/16/2001
Edit statu:	F	Well start:	09/01/1999
Gravel p 1:	270	Gravel p 2:	312
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004069		

Q148
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004072**

Well log:	77681	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-04		
Parcel no:	178-12-401-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/15/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	117
Depth dril:	147	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	145
Csng diame:	4.5		
Csng reduc:	0	Top perf:	124
Bottom per:	144	Perf inter:	1
Static wl:	36.4		
Temperatur:	0		
Yield:	5		
Drawdown:	0		
Hours pump:	.75		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/14/1999
Gravel p 1:	124	Gravel p 2:	147
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004072		

Q149
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004071**

Well log:	77680	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-03		
Parcel no:	178-12-401-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/13/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	213
Depth dril:	251	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	249
Csng diame:	4.5		
Csng reduc:	0	Top perf:	219
Bottom per:	249	Perf inter:	1
Static wl:	8		
Temperatur:	0		
Yield:	10		
Drawdown:	0		
Hours pump:	.75		
Test metho:	B	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	DSDAVIS	Date updat:	01/07/2000
Edit statu:	F	Well start:	09/10/1999
Gravel p 1:	213	Gravel p 2:	251
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004071		

Q150
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004077**

Well log:	94261	App:	Not Reported
Notice of :	26211	Waiver no:	Not Reported
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	02		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/15/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	59	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	59
Csng diame:	4		
Csng reduc:	0	Top perf:	25
Bottom per:	59	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	11/22/2002
Edit statu:	F	Well start:	07/09/2004
Gravel p 1:	23	Gravel p 2:	59

Utm x:	679361.895993
Utm y:	3990850.69181
Site id:	NV4000000004077

Q151
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004083**

Well log:	107354	App:	Not Reported
Notice of :	33716	Waiver no:	Not Reported
Date log r:	11/12/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-127		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/29/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	33
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2		
Csng reduc:	0	Top perf:	35
Bottom per:	50	Perf inter:	1
Static wl:	38.7		
Temperatur:	0		
Yield:	.5		
Drawdown:	1.2		
Hours pump:	4		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2313	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/20/2009
Update use:	Not Reported	Date updat:	12/30/2004
Edit statu:	F	Well start:	06/29/2008
Gravel p 1:	33	Gravel p 2:	50

Utm x:	679361.895993
Utm y:	3990850.69181
Site id:	NV4000000004083

Q152
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004082**

Well log:	95128	App:	Not Reported
Notice of :	27442	Waiver no:	Not Reported
Date log r:	02/08/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/15/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	28
Bottom per:	50	Perf inter:	1
Static wl:	36		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/16/2005
Update use:	Not Reported	Date updat:	12/30/2004
Edit statu:	F	Well start:	11/15/2004
Gravel p 1:	28	Gravel p 2:	50
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004082		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

Q153
WNW
1/2 - 1 Mile
Lower | **NV WELLS** | **NV4000000004085**

Well log:	108494	App:	Not Reported
Notice of :	34489	Waiver no:	Not Reported
Date log r:	08/10/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	S OF WARM SPRINGS E OF EASTGATE RD		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/16/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	226
Depth dril:	295	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	295
Csng diame:	4.5		
Csng reduc:	0	Top perf:	232
Bottom per:	292	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=ROTOSONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	DBRANTLEY	Date updat:	09/16/2009
Edit statu:	F	Well start:	06/27/2009
Gravel p 1:	229	Gravel p 2:	293
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004085		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

Q154
WNW
1/2 - 1 Mile
Lower | **NV WELLS** | **NV4000000004084**

Well log:	107355	App:	Not Reported
Notice of :	33716	Waiver no:	Not Reported
Date log r:	11/12/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	M-125		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/01/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	33
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2		
Csng reduc:	0	Top perf:	35
Bottom per:	50	Perf inter:	1
Static wl:	39.25		
Temperatur:	0		
Yield:	.5		
Drawdown:	.93		
Hours pump:	4		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2313	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/20/2009
Update use:	Not Reported	Date updat:	12/30/2004
Edit statu:	F	Well start:	06/30/2008
Gravel p 1:	33	Gravel p 2:	50
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004084		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

Q155
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004079**

Well log:	94263	App:	Not Reported
Notice of :	26211	Waiver no:	R-1244
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	01		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/09/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	59	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	59
Csng diame:	6		
Csng reduc:	0	Top perf:	25
Bottom per:	59	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	DBRANTLEY	Date updat:	01/05/2005
Edit statu:	F	Well start:	07/06/2004
Gravel p 1:	23	Gravel p 2:	59
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004079		

Q156
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004078**

Well log:	94262	App:	Not Reported
Notice of :	26211	Waiver no:	Not Reported
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	03		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/15/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	59	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	59
Csng diame:	4		
Csng reduc:	0	Top perf:	25
Bottom per:	59	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	11/22/2002
Edit statu:	F	Well start:	07/09/2004
Gravel p 1:	23	Gravel p 2:	59
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004078		

Q157
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004081**

Well log:	94401	App:	Not Reported
Notice of :	24708	Waiver no:	Not Reported
Date log r:	08/26/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB

Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/07/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	13
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	58
Csng diame:	4.5		
Csng reduc:	0	Top perf:	28
Bottom per:	58	Perf inter:	1
Static wl:	60.12		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	0	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/15/2004
Update use:	SGARDELLA	Date updat:	12/30/2004
Edit statu:	F	Well start:	08/06/2004
Gravel p 1:	21	Gravel p 2:	60
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004081		

Q158
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004080**

Well log:	94264	App:	Not Reported
Notice of :	26211	Waiver no:	R-1244
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	02		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/09/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	59	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	59
Csng diame:	6		
Csng reduc:	0	Top perf:	25
Bottom per:	59	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	DBRANTLEY	Date updat:	01/05/2005
Edit statu:	F	Well start:	07/06/2004
Gravel p 1:	23	Gravel p 2:	59
Utm x:	679361.895993		
Utm y:	3990850.69181		
Site id:	NV4000000004080		

R159
East
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004016**

Well log:	98874	App:	Not Reported
Notice of :	28678	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	179-07-401-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/14/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	67	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	57
Csng diame:	4		
Csng reduc:	0	Top perf:	37
Bottom per:	57	Perf inter:	1
Static wl:	46.98		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/30/2006
Update use:	Not Reported	Date updat:	09/21/2000
Edit statu:	F	Well start:	12/10/2005
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680967.996309		
Utm y:	3990667.90005		
Site id:	NV4000000004016		

S160
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004411**

Well log:	86878	App:	Not Reported
Notice of :	20465	Waiver no:	Not Reported
Date log r:	09/16/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	BOYD GAMING CORP		
Owner addr:	920 N BOULDER HWY		
Owner no:	MW-02		
Parcel no:	178-12-602-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/05/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/25/2002
Update use:	Not Reported	Date updat:	10/31/2001
Edit statu:	F	Well start:	09/05/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680554.880928		
Utm y:	3991275.94324		
Site id:	NV4000000004411		

S161
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004410**

Well log:	86877	App:	Not Reported
Notice of :	20465	Waiver no:	Not Reported
Date log r:	09/16/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	BOYD GAMING CORP		
Owner addr:	920 N BOULDER HWY		
Owner no:	MW-01		
Parcel no:	178-12-602-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/05/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/25/2002
Update use:	Not Reported	Date updat:	10/31/2001
Edit statu:	F	Well start:	09/05/2002
Gravel p 1:	0	Gravel p 2:	0

Utm x:	680554.880928
Utm y:	3991275.94324
Site id:	NV4000000004410

S162
NNE **NV WELLS** **NV4000000004412**
1/2 - 1 Mile
Lower

Well log:	86879	App:	Not Reported
Notice of :	20465	Waiver no:	Not Reported
Date log r:	09/16/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	BOYD GAMING CORP		
Owner addr:	920 N BOULDER HWY		
Owner no:	MW-03		
Parcel no:	178-12-602-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/05/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/25/2002
Update use:	Not Reported	Date updat:	10/31/2001
Edit statu:	F	Well start:	09/05/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680554.880928		
Utm y:	3991275.94324		
Site id:	NV4000000004412		

Map ID
Direction
Distance
Elevation

Database	EDR ID Number
NV WELLS	**NV4000000004414**

S163
NNE
1/2 - 1 Mile
Lower

Well log:	98868	App:	Not Reported
Notice of :	28673	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-701-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/07/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	17
Depth dril:	41	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	39
Csng diame:	4		
Csng reduc:	0	Top perf:	19
Bottom per:	39	Perf inter:	1
Static wl:	29.09		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/30/2006
Update use:	DBRANTLEY	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/07/2005
Gravel p 1:	17	Gravel p 2:	39
Utm x:	680554.880928		
Utm y:	3991275.94324		
Site id:	NV4000000004414		

Map ID
Direction
Distance
Elevation

Database	EDR ID Number
NV WELLS	**NV4000000004413**

S164
NNE
1/2 - 1 Mile
Lower

Well log:	98849	App:	Not Reported
Notice of :	28672	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-601-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/07/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	17
Depth dril:	47	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	39
Csng diame:	4		
Csng reduc:	0	Top perf:	19
Bottom per:	39	Perf inter:	1
Static wl:	30.02		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2006
Update use:	DBRANTLEY	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/07/2005
Gravel p 1:	17	Gravel p 2:	39
Utm x:	680554.880928		
Utm y:	3991275.94324		
Site id:	NV4000000004413		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

S165
NE
1/2 - 1 Mile
Lower | **FED USGS** | **USGS3088825**

Agency cd:	USGS	Site no:	360302114594001
Site name:	212 S22 E62 12ADDB1 USBR PG201		
Latitude:	360302	EDR Site id:	USGS3088825
Longitude:	1145940	Dec lat:	36.05053167
Dec lon:	-114.99527106	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESENES12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1743.21		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19820416
Date inventoried:	19860612	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	19.	Hole depth:	23.
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1987-01-13
Water quality data end date:	1987-01-13	Water quality data count:	1
Ground water data begin date:	1982-04-16	Ground water data end date:	1987-06-19
Ground water data count:	67		

Ground-water levels, Number of Measurements: 134

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-19	16.52		1987-06-19	16.52	
1987-05-17	16.22		1987-05-17	16.22	
1987-04-15	15.84		1987-04-15	15.84	
1987-03-25	15.73		1987-03-25	15.73	
1987-02-26	15.85		1987-02-26	15.85	
1987-01-13	15.61		1987-01-13	15.61	
1987-01-05	15.66		1987-01-05	15.66	
1986-12-29	15.59		1986-12-29	15.59	
1986-12-22	15.48		1986-12-22	15.48	
1986-12-18	15.45		1986-12-18	15.45	
1986-12-08	15.46		1986-12-08	15.46	
1986-12-01	15.32		1986-12-01	15.32	
1986-11-24	15.19		1986-11-24	15.19	
1986-11-12	14.95		1986-11-12	14.95	
1986-11-04	14.77		1986-11-04	14.77	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1986-10-28	14.63	
1986-10-21	14.46	
1986-10-15	14.33	
1986-10-08	14.18	
1986-10-01	14.02	
1986-09-27	13.94	
1986-09-16	13.67	
1986-09-09	13.67	
1986-09-04	13.93	
1986-08-28	13.88	
1986-08-20	13.66	
1986-08-12	13.39	
1986-08-06	13.14	
1986-07-30	12.88	
1986-07-22	12.58	
1986-07-15	12.28	
1986-07-07	11.48	
1986-06-26	11.21	
1986-06-17	10.80	
1986-06-11	11.26	
1986-06-02	10.88	
1986-05-14	11.38	
1986-04-14	11.99	
1986-04-08	12.10	
1986-03-11	12.50	
1986-02-10	12.70	
1986-01-10	13.00	
1985-12-09	13.80	
1985-11-19	13.61	
1985-10-29	13.21	
1985-09-23	12.46	
1985-08-08	10.64	
1985-07-22	9.78	
1985-06-20	8.47	
1985-05-21	7.99	
1985-04-26	7.79	
1985-03-29	7.44	
1985-02-19	7.10	
1985-01-23	6.66	
1984-12-17	6.95	
1984-11-27	6.90	
1984-10-19	7.04	
1984-09-25	6.89	
1984-08-22	7.56	
1984-07-16	8.93	
1984-06-19	8.70	
1984-05-22	8.95	
1984-04-18	8.57	
1984-03-20	8.36	
1984-02-16	8.41	
1984-01-23	8.56	
1982-04-16	7	

Date	Feet below Surface	Feet to Sealevel
1986-10-28	14.63	
1986-10-21	14.46	
1986-10-15	14.33	
1986-10-08	14.18	
1986-10-01	14.02	
1986-09-27	13.94	
1986-09-16	13.67	
1986-09-09	13.67	
1986-09-04	13.93	
1986-08-28	13.88	
1986-08-20	13.66	
1986-08-12	13.39	
1986-08-06	13.14	
1986-07-30	12.88	
1986-07-22	12.58	
1986-07-15	12.28	
1986-07-07	11.48	
1986-06-26	11.21	
1986-06-17	10.80	
1986-06-11	11.26	
1986-06-02	10.88	
1986-05-14	11.38	
1986-04-14	11.99	
1986-04-08	12.10	
1986-03-11	12.50	
1986-02-10	12.70	
1986-01-10	13.00	
1985-12-09	13.80	
1985-11-19	13.61	
1985-10-29	13.21	
1985-09-23	12.46	
1985-08-08	10.64	
1985-07-22	9.78	
1985-06-20	8.47	
1985-05-21	7.99	
1985-04-26	7.79	
1985-03-29	7.44	
1985-02-19	7.10	
1985-01-23	6.66	
1984-12-17	6.95	
1984-11-27	6.90	
1984-10-19	7.04	
1984-09-25	6.89	
1984-08-22	7.56	
1984-07-16	8.93	
1984-06-19	8.70	
1984-05-22	8.95	
1984-04-18	8.57	
1984-03-20	8.36	
1984-02-16	8.41	
1984-01-23	8.56	
1982-04-16	7	

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

S166
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004420**

Well log:	68435	App:	Not Reported
Notice of :	17154	Waiver no:	Not Reported
Date log r:	10/20/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BOYD GAMING CORP		
Owner addr:	920 N BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-12-602-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/08/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	3
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	30
Csng diame:	2		
Csng reduc:	0	Top perf:	15
Bottom per:	30	Perf inter:	1
Static wl:	22		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	10/30/1997
Update use:	Not Reported	Date updat:	10/30/1997
Edit statu:	F	Well start:	10/07/1997
Gravel p 1:	13	Gravel p 2:	30
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004420		

S167
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004419**

Well log:	68434	App:	Not Reported
Notice of :	17154	Waiver no:	Not Reported
Date log r:	10/20/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BOYD GAMING CORP		
Owner addr:	920 N BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-12-602-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/08/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	3
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	30
Csng diame:	2		
Csng reduc:	0	Top perf:	15
Bottom per:	30	Perf inter:	1
Static wl:	22		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	10/30/1997
Update use:	Not Reported	Date updat:	10/30/1997
Edit statu:	F	Well start:	10/07/1997
Gravel p 1:	13	Gravel p 2:	30
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004419		

S168
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004422**

Well log:	69531	App:	Not Reported
Notice of :	16203	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD

Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2.25		
Csng reduc:	0	Top perf:	30
Bottom per:	40	Perf inter:	1
Static wl:	33		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	10/30/1997
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	28	Gravel p 2:	40
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004422		

S169
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004421**

Well log:	69530	App:	Not Reported
Notice of :	16203	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/31/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	0
Depth dril:	46	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2.25		
Csng reduc:	0	Top perf:	35
Bottom per:	45	Perf inter:	1
Static wl:	40		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	10/30/1997
Edit statu:	F	Well start:	07/31/1997
Gravel p 1:	33	Gravel p 2:	45
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004421		

S170
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004416**

Well log:	66633	App:	Not Reported
Notice of :	11355	Waiver no:	MO-2213
Date log r:	12/16/1992	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BROADBENT & ASSOCIATES		
Owner addr:	950 S BOULDER HWY HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/11/1992	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	25	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	25
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1817	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	Not Reported	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/11/1992
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004416		

S171
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004415**

Well log:	66557	App:	Not Reported
Notice of :	11356	Waiver no:	MO-2213
Date log r:	12/16/1992	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BROADBENT & ASSOCIATES		
Owner addr:	950 S BOULDER HWY HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/11/1992	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	25	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	25
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1817	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/1997
Update use:	Not Reported	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/11/1992
Gravel p 1:	0	Gravel p 2:	0

Utm x:	680579.905557
Utm y:	3991276.4587
Site id:	NV4000000004415

S172
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004418**

Well log:	68433	App:	Not Reported
Notice of :	17154	Waiver no:	Not Reported
Date log r:	10/20/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BOYD GAMING CORP		
Owner addr:	920 N BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-12-602-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/08/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	3
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	30
Csng diame:	2		
Csng reduc:	0	Top perf:	15
Bottom per:	30	Perf inter:	1
Static wl:	22		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	10/30/1997
Update use:	dsdavis	Date updat:	10/30/1997
Edit statu:	F	Well start:	10/07/1997
Gravel p 1:	13	Gravel p 2:	30
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004418		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

S173
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004417**

Well log:	66634	App:	Not Reported
Notice of :	11354	Waiver no:	MO-2213
Date log r:	12/16/1992	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BROADBENT & ASSOCIATES		
Owner addr:	950 S BOULDER HWY HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/11/1992	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	25	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	25
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1817	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/10/1997
Update use:	Not Reported	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/11/1992
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004417		

S174
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004428**

Well log:	69537	App:	Not Reported
Notice of :	16204	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	dsdavis	Date updat:	01/20/1998
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004428		

S175
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004427**

Well log:	69536	App:	Not Reported
Notice of :	16204	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD

Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	dsdavis	Date updat:	01/20/1998
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004427		

S176
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004430**

Well log:	71034	App:	Not Reported
Notice of :	17402	Waiver no:	Not Reported
Date log r:	04/14/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/05/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	10
Depth dril:	45	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	45
Csng diame:	6.25		
Csng reduc:	0	Top perf:	15
Bottom per:	45	Perf inter:	1
Static wl:	26		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/01/1998
Update use:	Not Reported	Date updat:	01/20/1998
Edit statu:	F	Well start:	03/04/1998
Gravel p 1:	13	Gravel p 2:	45
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004430		

S177
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004429**

Well log:	71033	App:	Not Reported
Notice of :	17402	Waiver no:	Not Reported
Date log r:	04/14/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/06/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	7
Depth dril:	41	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	41
Csng diame:	6.25		
Csng reduc:	0	Top perf:	11
Bottom per:	41	Perf inter:	1
Static wl:	23		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/01/1998
Update use:	Not Reported	Date updat:	01/20/1998
Edit statu:	F	Well start:	03/06/1998
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004429		

S178
NNE **NV WELLS** **NV4000000004424**
1/2 - 1 Mile
Lower

Well log:	69533	App:	Not Reported
Notice of :	16204	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	dsdavis	Date updat:	01/20/1998
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	0	Gravel p 2:	0

Utm x:	680579.905557
Utm y:	3991276.4587
Site id:	NV4000000004424

S179
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004423**

Well log:	69532	App:	Not Reported
Notice of :	16203	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	34
Depth dril:	46	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	46
Csng diame:	2.25		
Csng reduc:	0	Top perf:	36
Bottom per:	46	Perf inter:	1
Static wl:	40		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	10/30/1997
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	34	Gravel p 2:	46
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004423		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

S180
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004426**

Well log:	69535	App:	Not Reported
Notice of :	16204	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	dsdavis	Date updat:	01/20/1998
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004426		

S181
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004425**

Well log:	69534	App:	Not Reported
Notice of :	16204	Waiver no:	Not Reported
Date log r:	12/12/1997	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/1997	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	dsdavis	Date updat:	01/20/1998
Edit statu:	F	Well start:	07/29/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680579.905557		
Utm y:	3991276.4587		
Site id:	NV4000000004425		

R182
East
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004017**

Well log:	60862	App:	Not Reported
Notice of :	17250	Waiver no:	MO-2766
Date log r:	02/07/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CC

Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/18/1996	Date cmplt:	D
Gravel pac:	Y	Depth seal:	10
Depth dril:	42	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	42
Csng diame:	4.25		
Csng reduc:	0	Top perf:	12
Bottom per:	42	Perf inter:	1
Static wl:	26		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	1847	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/13/1997
Update use:	Not Reported	Date updat:	09/21/2000
Edit statu:	F	Well start:	12/18/1996
Gravel p 1:	10	Gravel p 2:	42
Utm x:	680993.02272		
Utm y:	3990668.41663		
Site id:	NV4000000004017		

R183
East
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004018**

Well log:	60863	App:	Not Reported
Notice of :	17250	Waiver no:	MO-2766
Date log r:	02/07/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/18/1996	Date cmplt:	D
Gravel pac:	Y	Depth seal:	18
Depth dril:	50	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4.25		
Csng reduc:	0	Top perf:	20
Bottom per:	50	Perf inter:	1
Static wl:	31		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	1847	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/13/1997
Update use:	Not Reported	Date updat:	09/21/2000
Edit statu:	F	Well start:	12/18/1996
Gravel p 1:	18	Gravel p 2:	50
Utm x:	680993.02272		
Utm y:	3990668.41663		
Site id:	NV4000000004018		

R184
East
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004019**

Well log:	60864	App:	Not Reported
Notice of :	17250	Waiver no:	MO-2766
Date log r:	02/07/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CC
Legal quar:	SW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/17/1996	Date cmplt:	D
Gravel pac:	Y	Depth seal:	13
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	45
Csng diame:	4.25		
Csng reduc:	0	Top perf:	15
Bottom per:	45	Perf inter:	1
Static wl:	27		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	1847	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/13/1997
Update use:	Not Reported	Date updat:	09/21/2000
Edit statu:	F	Well start:	12/17/1996
Gravel p 1:	13	Gravel p 2:	45
Utm x:	680993.02272		
Utm y:	3990668.41663		
Site id:	NV4000000004019		

T185
WSW
1/2 - 1 Mile
Higher

FED USGS **USGS3100073**

Agency cd:	USGS	Site no:	360226115003201
Site name:	212 S22 E62 13BBBD1 BMI		
Latitude:	360226	EDR Site id:	USGS3100073
Longitude:	1150032	Dec lat:	36.04053166
Dec lon:	-115.00971554	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNWNWS13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1810.00		
Altitude method:	Level or other surveying method		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	133	Hole depth:	1233
Source of depth data:	Not Reported		
Project number:	NV-79-081		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1942-05-12	Ground water data end date:	1942-05-12
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1942-05-12	0.00	

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

U186
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003758**

Well log:	96750	App:	Not Reported
Notice of :	26912	Waiver no:	Not Reported
Date log r:	05/24/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	WATER ST & LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	179-18-101-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	2		
Csng reduc:	0	Top perf:	45
Bottom per:	70	Perf inter:	1
Static wl:	53		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	5115 S INDUSTRIAL RD #104 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/20/2005
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/20/2005
Gravel p 1:	40	Gravel p 2:	70
Utm x:	680976.264153		
Utm y:	3990267.30584		
Site id:	NV4000000003758		

U187
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003757**

Well log:	96749	App:	Not Reported
Notice of :	26912	Waiver no:	Not Reported
Date log r:	05/24/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	WATER ST & LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	179-18-101-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	92	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	92
Csng diame:	2		
Csng reduc:	0	Top perf:	42
Bottom per:	92	Perf inter:	1
Static wl:	72		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	5115 S INDUSTRIAL RD #104 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/20/2005
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/20/2005
Gravel p 1:	35	Gravel p 2:	92
Utm x:	680976.264153		
Utm y:	3990267.30584		
Site id:	NV4000000003757		

U188
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003756**

Well log:	96748	App:	Not Reported
Notice of :	26912	Waiver no:	Not Reported
Date log r:	05/24/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	WATER ST & LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	179-18-101-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	92	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	92
Csng diame:	2		
Csng reduc:	0	Top perf:	42
Bottom per:	92	Perf inter:	1
Static wl:	72		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	5115 S INDUSTRIAL RD #104 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/20/2005
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/20/2005
Gravel p 1:	35	Gravel p 2:	92
Utm x:	680976.264153		
Utm y:	3990267.30584		
Site id:	NV4000000003756		

U189
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003759**

Well log:	96751	App:	Not Reported
Notice of :	26912	Waiver no:	Not Reported
Date log r:	05/24/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	WATER ST & LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	179-18-101-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	72	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	72
Csng diame:	2		
Csng reduc:	0	Top perf:	47
Bottom per:	72	Perf inter:	1
Static wl:	53		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	5115 S INDUSTRIAL RD #104 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/20/2005
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/20/2005
Gravel p 1:	40	Gravel p 2:	72
Utm x:	680976.264153		
Utm y:	3990267.30584		
Site id:	NV4000000003759		

U190
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003762**

Well log:	107407	App:	Not Reported
Notice of :	62024	Waiver no:	Not Reported
Date log r:	09/04/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	181 N WATER ST		
Owner no:	Not Reported		
Parcel no:	179-18-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/22/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	68	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	66
Csng diame:	4		
Csng reduc:	0	Top perf:	41
Bottom per:	66	Perf inter:	1
Static wl:	55		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2234	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/21/2009
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/22/2008
Gravel p 1:	39	Gravel p 2:	68
Utm x:	680976.264153		
Utm y:	3990267.30584		
Site id:	NV4000000003762		

U191
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003761**

Well log:	103968	App:	Not Reported
Notice of :	34546	Waiver no:	Not Reported
Date log r:	11/20/2007	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	LAKE MEAD CROSSING LLC		
Owner addr:	110 W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	179-18-111-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/16/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	69	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	67
Csng diame:	4		
Csng reduc:	0	Top perf:	37
Bottom per:	67	Perf inter:	1
Static wl:	56		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	4255 W POST RD LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1944	Source age:	NV003
User id:	SGARDELLA	Date entry:	12/03/2007
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	11/16/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680976.264153		
Utm y:	3990267.30584		
Site id:	NV4000000003761		

U192
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003760**

Well log:	103356	App:	Not Reported
Notice of :	30957	Waiver no:	Not Reported
Date log r:	05/31/2007	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	LAKE MEAD CROSSING LLC		
Owner addr:	110 W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/24/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	72	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	72
Csng diame:	2		
Csng reduc:	0	Top perf:	47
Bottom per:	72	Perf inter:	1
Static wl:	56.4		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	4255 W POST RD LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1944	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/11/2007
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/24/2007
Gravel p 1:	0	Gravel p 2:	0

Utm x:	680976.264153
Utm y:	3990267.30584
Site id:	NV4000000003760

T193
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003628**

Well log:	94307	App:	Not Reported
Notice of :	26241	Waiver no:	Not Reported
Date log r:	10/25/2004	Date log 1:	D
Site type:	E	Work type:	D
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/27/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	260
Depth dril:	300	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	300
Csng diame:	4		
Csng reduc:	0	Top perf:	275
Bottom per:	295	Perf inter:	1
Static wl:	5		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	2249	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/02/2004
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	08/24/2004
Gravel p 1:	268	Gravel p 2:	300
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003628		

Map ID Direction Distance Elevation		Database	EDR ID Number
T194 **WSW** **1/2 - 1 Mile** **Higher**		**NV WELLS**	**NV4000000003627**

Well log:	94269	App:	Not Reported
Notice of :	26213	Waiver no:	Not Reported
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	03		
Parcel no:	178-13-001-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	8
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	6		
Csng reduc:	0	Top perf:	10
Bottom per:	40	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	07/26/2004
Gravel p 1:	8	Gravel p 2:	40
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003627		

T195 **WSW** **1/2 - 1 Mile** **Higher**		**NV WELLS**	**NV4000000003626**

Well log:	94268	App:	Not Reported
Notice of :	26213	Waiver no:	Not Reported
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	02		
Parcel no:	178-13-001-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	8
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	6		
Csng reduc:	0	Top perf:	10
Bottom per:	40	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	07/26/2004
Gravel p 1:	8	Gravel p 2:	40
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003626		

T196
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003631**

Well log:	100749	App:	Not Reported
Notice of :	30221	Waiver no:	Not Reported
Date log r:	09/18/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	03		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/17/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	44		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	W D C EXPLORATION & WELLS		
Contract 2:	500 MAIN ST WOODLAND CA 95695		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/26/2006
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	08/01/2006
Gravel p 1:	37	Gravel p 2:	60
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003631		

T197
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003630**

Well log:	100748	App:	Not Reported
Notice of :	30221	Waiver no:	Not Reported
Date log r:	09/18/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	02		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/17/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	44		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	W D C EXPLORATION & WELLS		
Contract 2:	500 MAIN ST WOODLAND CA 95695		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/26/2006
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	08/01/2006
Gravel p 1:	37	Gravel p 2:	60
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003630		

T198
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003629**

Well log:	100747	App:	Not Reported
Notice of :	30221	Waiver no:	Not Reported
Date log r:	09/18/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	01		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/17/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	44		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	W D C EXPLORATION & WELLS		
Contract 2:	500 MAIN ST WOODLAND CA 95695		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/26/2006
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	08/01/2006
Gravel p 1:	37	Gravel p 2:	60
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003629		

T199
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003622**

Well log:	92607	App:	Not Reported
Notice of :	37370	Waiver no:	Not Reported
Date log r:	02/09/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	800 LAKE MEAD DR		
Owner no:	VMP-01		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/14/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	4
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	42
Csng diame:	2		
Csng reduc:	0	Top perf:	5
Bottom per:	42	Perf inter:	2
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2190	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/05/2004
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/14/2003
Gravel p 1:	4	Gravel p 2:	50
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003622		

T200
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003621**

Well log:	92606	App:	Not Reported
Notice of :	37370	Waiver no:	Not Reported
Date log r:	02/09/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	800 LAKE MEAD DR		
Owner no:	VMP-03		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/12/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	4
Depth dril:	52	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2		
Csng reduc:	0	Top perf:	5
Bottom per:	45	Perf inter:	2
Static wl:	45		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2190	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/05/2004
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/12/2003
Gravel p 1:	4	Gravel p 2:	52
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003621		

T201
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003620**

Well log:	37014	App:	Not Reported
Notice of :	2738	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-076		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/30/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	44
Bottom per:	54	Perf inter:	1
Static wl:	43		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	12/30/2008
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/30/1989
Gravel p 1:	39	Gravel p 2:	60
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003620		

T202
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003625**

Well log:	94267	App:	Not Reported
Notice of :	26213	Waiver no:	Not Reported
Date log r:	10/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	01		
Parcel no:	178-13-001-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/29/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	8
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	6		
Csng reduc:	0	Top perf:	10
Bottom per:	40	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	07/26/2004
Gravel p 1:	8	Gravel p 2:	40

Utm x:	679378.285228
Utm y:	3990049.50606
Site id:	NV4000000003625

T203
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003624**

Well log:	92609	App:	Not Reported
Notice of :	37370	Waiver no:	Not Reported
Date log r:	02/09/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	800 LAKE MEAD DR		
Owner no:	VEW-01		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/13/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	4
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	42
Csng diame:	6		
Csng reduc:	0	Top perf:	5
Bottom per:	42	Perf inter:	2
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2190	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/05/2004
Update use:	DBRANTLEY	Date updat:	05/19/2004
Edit statu:	F	Well start:	08/13/2003
Gravel p 1:	4	Gravel p 2:	45
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003624		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

T204
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003623**

Well log:	92608	App:	Not Reported
Notice of :	37370	Waiver no:	Not Reported
Date log r:	02/09/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	800 LAKE MEAD DR		
Owner no:	VMP-02		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/13/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	4
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	42
Csng diame:	2		
Csng reduc:	0	Top perf:	5
Bottom per:	42	Perf inter:	2
Static wl:	45.5		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2190	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/05/2004
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/12/2003
Gravel p 1:	4	Gravel p 2:	50
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003623		

T205
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003632**

Well log:	100750	App:	Not Reported
Notice of :	30221	Waiver no:	Not Reported
Date log r:	09/18/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	04		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/17/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	44		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	W D C EXPLORATION & WELLS		
Contract 2:	500 MAIN ST WOODLAND CA 95695		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/26/2006
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	08/01/2006
Gravel p 1:	37	Gravel p 2:	60
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003632		

T206
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003641**

Well log:	104501	App:	Not Reported
Notice of :	34887	Waiver no:	R-1388
Date log r:	11/30/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	VEW-06		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/19/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	44	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	43
Csng diame:	6		
Csng reduc:	0	Top perf:	13
Bottom per:	43	Perf inter:	2
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51207		
Contract 1:	CASCADE DRILLING INC CALIFORNIA		
Contract 2:	3632 OMEC CIRCLE RANCHO CORDOVA CA 95742		
Contract 3:	0		
Driller li:	2348	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/14/2008
Update use:	DBRANTLEY	Date updat:	01/15/2008
Edit statu:	F	Well start:	10/19/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003641		

T207
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003640**

Well log:	104500	App:	Not Reported
Notice of :	34886	Waiver no:	R-1388
Date log r:	11/30/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	VEW-05		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/19/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	41	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	6		
Csng reduc:	0	Top perf:	15
Bottom per:	40	Perf inter:	2
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51207		
Contract 1:	CASCADE DRILLING INC CALIFORNIA		
Contract 2:	3632 OMEC CIRCLE RANCHO CORDOVA CA 95742		
Contract 3:	0		
Driller li:	2348	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/14/2008
Update use:	DBRANTLEY	Date updat:	01/15/2008
Edit statu:	F	Well start:	10/19/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003640		

T208
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003639**

Well log:	104499	App:	Not Reported
Notice of :	34885	Waiver no:	R-1388
Date log r:	11/30/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	VEW-04S		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/19/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	16	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	15
Csng diame:	6		
Csng reduc:	0	Top perf:	5
Bottom per:	15	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51207		
Contract 1:	CASCADE DRILLING INC CALIFORNIA		
Contract 2:	3632 OMEC CIRCLE RANCHO CORDOVA CA 95742		
Contract 3:	0		
Driller li:	2348	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/14/2008
Update use:	DBRANTLEY	Date updat:	01/15/2008
Edit statu:	F	Well start:	10/19/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003639		

T209
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003644**

Well log:	108506	App:	Not Reported
Notice of :	60945	Waiver no:	Not Reported
Date log r:	08/10/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	S OF WARM SPRINGS E OF EASTGATE RD		
Owner no:	Not Reported		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/16/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	248
Depth dril:	298	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	288
Csng diame:	4.5		
Csng reduc:	0	Top perf:	255
Bottom per:	285	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD=ROTOSONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	Not Reported	Date updat:	09/16/2009
Edit statu:	F	Well start:	06/16/2009
Gravel p 1:	252	Gravel p 2:	286
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003644		

T210
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003643**

Well log:	108493	App:	Not Reported
Notice of :	60946	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	350 FOURTH ST		
Owner no:	Not Reported		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/15/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	234
Depth dril:	265	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	265
Csng diame:	4.5		
Csng reduc:	0	Top perf:	242
Bottom per:	262	Perf inter:	1
Static wl:	10		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD=ROTOSONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	DBRANTLEY	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/17/2009
Gravel p 1:	239	Gravel p 2:	263
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003643		

T211
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003642**

Well log:	107264	App:	Not Reported
Notice of :	34045	Waiver no:	Not Reported
Date log r:	10/10/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	MW-12		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/09/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4.5		
Csng reduc:	0	Top perf:	35
Bottom per:	65	Perf inter:	1
Static wl:	45		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	W D C EXPLORATION & WELLS		
Contract 2:	500 MAIN ST WOODLAND CA 95695		
Contract 3:	0		
Driller li:	2371	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/02/2009
Update use:	Not Reported	Date updat:	01/15/2008
Edit statu:	F	Well start:	10/09/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003642		

T212
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003635**

Well log:	102336	App:	Not Reported
Notice of :	27380	Waiver no:	Not Reported
Date log r:	01/22/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	SELLERS, GARY		
Owner addr:	8000 W LAKE MEAD OKWY		
Owner no:	AA-MW-14		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/31/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	170	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	53
Csng diame:	4		
Csng reduc:	0	Top perf:	33
Bottom per:	53	Perf inter:	1
Static wl:	32		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2270	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/01/2007
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	10/27/2006
Gravel p 1:	30	Gravel p 2:	53

Utm x:	679378.285228
Utm y:	3990049.50606
Site id:	NV4000000003635

T213
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003634**

Well log:	102335	App:	Not Reported
Notice of :	27380	Waiver no:	Not Reported
Date log r:	01/22/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	SELLERS, GARY		
Owner addr:	8000 W LAKE MEAD OKWY		
Owner no:	RB-03		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/31/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	170	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	53
Csng diame:	4		
Csng reduc:	0	Top perf:	33
Bottom per:	53	Perf inter:	1
Static wl:	32		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2270	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/01/2007
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	10/27/2006
Gravel p 1:	30	Gravel p 2:	53
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003634		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database	EDR ID Number
NV WELLS	**NV4000000003633**

T214
WSW
1/2 - 1 Mile
Higher

Well log:	100751	App:	Not Reported
Notice of :	30221	Waiver no:	Not Reported
Date log r:	09/18/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	05		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/17/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	37
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	44		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	W D C EXPLORATION & WELLS		
Contract 2:	500 MAIN ST WOODLAND CA 95695		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/26/2006
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	08/01/2006
Gravel p 1:	37	Gravel p 2:	60
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003633		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

T215
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003638**

Well log:	104498	App:	Not Reported
Notice of :	34888	Waiver no:	R-1388
Date log r:	11/30/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD DR		
Owner no:	VEW-07		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/19/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	41	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	6		
Csng reduc:	0	Top perf:	10
Bottom per:	40	Perf inter:	2
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51207		
Contract 1:	CASCADE DRILLING INC CALIFORNIA		
Contract 2:	3632 OMEC CIRCLE RANCHO CORDOVA CA 95742		
Contract 3:	0		
Driller li:	2348	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/14/2008
Update use:	DBRANTLEY	Date updat:	01/15/2008
Edit statu:	F	Well start:	10/19/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003638		

T216
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003637**

Well log:	102958	App:	Not Reported
Notice of :	27512	Waiver no:	Not Reported
Date log r:	06/04/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	SYLVIA, CHRIS		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	MCMW-13		
Parcel no:	178-13-101-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/18/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	98
Depth dril:	150	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	125
Csng diame:	4.5		
Csng reduc:	0	Top perf:	100
Bottom per:	120	Perf inter:	1
Static wl:	101		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2250	Source age:	NV003
User id:	SGARDELLA	Date entry:	06/21/2007
Update use:	SGARDELLA	Date updat:	06/21/2007
Edit statu:	F	Well start:	04/16/2007
Gravel p 1:	98	Gravel p 2:	121
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003637		

T217
WSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003636**

Well log:	102337	App:	Not Reported
Notice of :	27506	Waiver no:	Not Reported
Date log r:	01/22/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	SYLVIA, CHRIS		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	RB-02		
Parcel no:	178-13-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/26/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	45
Depth dril:	150	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	133
Csng diame:	2		
Csng reduc:	0	Top perf:	45
Bottom per:	133	Perf inter:	2
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2270	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/01/2007
Update use:	Not Reported	Date updat:	05/19/2004
Edit statu:	F	Well start:	10/23/2006
Gravel p 1:	45	Gravel p 2:	133
Utm x:	679378.285228		
Utm y:	3990049.50606		
Site id:	NV4000000003636		

V218
South
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003391**

Well log:	79408	App:	Not Reported
Notice of :	20476	Waiver no:	Not Reported
Date log r:	03/30/2000	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	AC

Legal quar:	SW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-601-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/22/2000	Date cmplt:	D
Gravel pac:	Y	Depth seal:	10
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	90
Csng diame:	2		
Csng reduc:	0	Top perf:	70
Bottom per:	90	Perf inter:	1
Static wl:	55		
Temperatur:	78		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	48704		
Contract 1:	A D A COMPLIANCE CORP		
Contract 2:	3915 W HACIENDA AVE STE A-111 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	2021	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/22/2000
Update use:	DBRANTLEY	Date updat:	05/22/2000
Edit statu:	F	Well start:	03/22/2000
Gravel p 1:	75	Gravel p 2:	90
Utm x:	680188.04509		
Utm y:	3989634.51647		
Site id:	NV4000000003391		

V219
South
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003392**

Well log:	109484	App:	Not Reported
Notice of :	34493	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	AC
Legal quar:	SW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	N OF LAKE MEAD PKWY & E OF 4TH ST		
Owner no:	M-138		
Parcel no:	178-13-601-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/06/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	65	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	65
Csng diame:	2.375		
Csng reduc:	0	Top perf:	50
Bottom per:	65	Perf inter:	1
Static wl:	50		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/17/2009
Update use:	Not Reported	Date updat:	05/22/2000
Edit statu:	F	Well start:	07/30/2009
Gravel p 1:	40	Gravel p 2:	65
Utm x:	680188.04509		
Utm y:	3989634.51647		
Site id:	NV4000000003392		

W220
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004534**

Well log:	89629	App:	Not Reported
Notice of :	24811	Waiver no:	Not Reported
Date log r:	06/09/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	A
Legal quar:	NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/02/2003	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	5
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2		
Csng reduc:	0	Top perf:	23
Bottom per:	33	Perf inter:	28
Static wl:	28		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	BUDGET DRILLING CO		
Contract 2:	P O BOX 3505 PAHRUMP NV 89041		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/11/2003
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	05/22/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680350.879946		
Utm y:	3991456.71172		
Site id:	NV4000000004534		

W221
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004535**

Well log:	89631	App:	Not Reported
Notice of :	24765	Waiver no:	Not Reported
Date log r:	06/09/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	A
Legal quar:	NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/09/2003	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	5
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2		
Csng reduc:	0	Top perf:	23
Bottom per:	33	Perf inter:	28
Static wl:	26		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	BUDGET DRILLING CO		
Contract 2:	P O BOX 3505 PAHRUMP NV 89041		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/11/2003
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	05/22/2003
Gravel p 1:	0	Gravel p 2:	0

Utm x:	680350.879946
Utm y:	3991456.71172
Site id:	NV4000000004535

W222
NNE **NV WELLS** **NV4000000004536**
1/2 - 1 Mile
Lower

Well log:	89632	App:	Not Reported
Notice of :	24765	Waiver no:	Not Reported
Date log r:	06/09/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	A
Legal quar:	NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/09/2003	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	5
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2		
Csng reduc:	0	Top perf:	23
Bottom per:	33	Perf inter:	28
Static wl:	26		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	BUDGET DRILLING CO		
Contract 2:	P O BOX 3505 PAHRUMP NV 89041		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/11/2003
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	05/22/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680350.879946		
Utm y:	3991456.71172		
Site id:	NV4000000004536		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

X223
NE
1/2 - 1 Mile
Lower

FED USGS **USGS3088827**

Agency cd:	USGS	Site no:	360303114593601
Site name:	212 S22 E62 12ADAD1 USBR PG301		
Latitude:	360303	EDR Site id:	USGS3088827
Longitude:	1145936	Dec lat:	36.05080945
Dec lon:	-114.99415991	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NESENES12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1737.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19861102	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	36.	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1986-09-29
Water quality data end date:	1987-01-16	Water quality data count:	2
Ground water data begin date:	1986-11-02	Ground water data end date:	1987-05-17
Ground water data count:	15		

Ground-water levels, Number of Measurements: 15

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-05-17	16.06		1987-04-15	15.59	
1987-03-20	15.55		1987-02-26	16.09	
1987-01-16	15.25		1987-01-05	15.75	
1986-12-29	15.62		1986-12-22	15.40	
1986-12-18	15.22		1986-12-08	15.60	
1986-12-01	15.46		1986-11-24	15.32	
1986-11-21	15.22		1986-11-12	15.06	
1986-11-02	14.83				

Y224
SSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003388**

Well log:	77674	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-09		
Parcel no:	178-13-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/07/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	210
Depth dril:	250	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	250
Csng diame:	4.5		
Csng reduc:	0	Top perf:	230
Bottom per:	250	Perf inter:	1
Static wl:	64		
Temperatur:	0		
Yield:	12		
Drawdown:	0		
Hours pump:	1		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	Not Reported	Date updat:	03/05/1999
Edit statu:	F	Well start:	10/06/1999
Gravel p 1:	210	Gravel p 2:	250
Utm x:	679787.576886		
Utm y:	3989626.29843		
Site id:	NV4000000003388		

Y225
SSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003389**

Well log:	77675	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BD

Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-10		
Parcel no:	178-13-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/08/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	70
Depth dril:	102	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	101
Csng diame:	4.5		
Csng reduc:	0	Top perf:	80
Bottom per:	100	Perf inter:	1
Static wl:	59.7		
Temperatur:	0		
Yield:	12		
Drawdown:	0		
Hours pump:	.75		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	Not Reported	Date updat:	03/05/1999
Edit statu:	F	Well start:	10/08/1999
Gravel p 1:	80	Gravel p 2:	102
Utm x:	679787.576886		
Utm y:	3989626.29843		
Site id:	NV4000000003389		

Y226
SSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003390**

Well log:	109483	App:	Not Reported
Notice of :	34492	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	N OF LAKE MEAD PKWY & E OF 4TH ST		
Owner no:	M-137		
Parcel no:	178-13-601-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/06/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	42
Depth dril:	75	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	75
Csng diame:	2.375		
Csng reduc:	0	Top perf:	52
Bottom per:	72	Perf inter:	1
Static wl:	50		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/17/2009
Update use:	Not Reported	Date updat:	03/05/1999
Edit statu:	F	Well start:	07/29/2009
Gravel p 1:	42	Gravel p 2:	75
Utm x:	679787.576886		
Utm y:	3989626.29843		
Site id:	NV4000000003390		

X227
NE
1/2 - 1 Mile
Lower

FED USGS **USGS3088826**

Agency cd:	USGS	Site no:	360303114593401
Site name:	212 S22 E62 12ADDA1 USBR PG202		
Latitude:	360303	EDR Site id:	USGS3088826
Longitude:	1145934	Dec lat:	36.05080946
Dec lon:	-114.99360434	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SESENES12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1736.48		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19820401
Date inventoried:	19860612	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	20.	Hole depth:	30.
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count: 0
Water quality data end date: 1987-01-15
Ground water data begin date: 1984-01-23
Ground water data count: 60
Water quality data begin date: 1986-09-29
Water quality data count: 2
Ground water data end date: 1987-05-17

Ground-water levels, Number of Measurements: 60

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-05-17	19.95		1987-04-15	19.79	
1987-03-20	17.81				
1987-02-26					
Note: The site was dry (no water level recorded).					
1987-01-15	19.18		1986-12-22	19.45	
1986-12-18	19.00		1986-11-12	19.73	
1986-11-04	19.56		1986-10-28	19.31	
1986-10-21	19.07		1986-10-15	18.86	
1986-10-08	18.60		1986-10-01	18.17	
1986-09-27	17.95		1986-09-16	16.71	
1986-09-09	15.45		1986-09-04	15.29	
1986-08-28	18.49		1986-08-20	18.22	
1986-08-12	17.78		1986-08-06	17.25	
1986-07-30	16.90		1986-07-23	16.42	
1986-07-15	15.85		1986-07-08	14.55	
1986-06-25	13.12		1986-06-18	11.67	
1986-06-11	10.14		1986-06-02	9.66	
1986-05-14	9.66		1986-04-14	11.21	
1986-04-07	11.60		1986-03-11	12.60	
1986-02-10	14.70		1986-01-06	13.80	
1985-12-09	17.00		1985-11-19	17.17	
1985-10-29	17.53		1985-09-23	16.29	
1985-08-08	14.04		1985-07-22	7.91	
1985-06-17	8.73		1985-05-21	8.78	
1985-04-25	7.96		1985-03-29	7.44	
1985-02-19	7.32		1985-01-23	7.18	
1984-12-17	6.95		1984-11-27	5.90	
1984-10-19	5.91		1984-09-25	5.34	
1984-08-22	5.83		1984-07-16	7.68	
1984-06-20	7.88		1984-05-22	8.02	
1984-04-17	8.09		1984-03-20	7.58	
1984-02-14	7.60		1984-01-23	7.74	

Z228
ENE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004275**

Well log:	98875	App:	Not Reported
Notice of :	28677	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CB

Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	179-07-301-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/09/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	67	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	57
Csng diame:	4		
Csng reduc:	0	Top perf:	37
Bottom per:	57	Perf inter:	1
Static wl:	43.81		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/30/2006
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	12/09/2005
Gravel p 1:	35	Gravel p 2:	57
Utm x:	680959.091671		
Utm y:	3991099.30945		
Site id:	NV4000000004275		

Z229
ENE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004274**

Well log:	98871	App:	Not Reported
Notice of :	28676	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CB

Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	179-07-301-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/09/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	17
Depth dril:	57	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	45
Csng diame:	4		
Csng reduc:	0	Top perf:	25
Bottom per:	45	Perf inter:	1
Static wl:	37.46		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/30/2006
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	12/08/2005
Gravel p 1:	17	Gravel p 2:	45
Utm x:	680959.091671		
Utm y:	3991099.30945		
Site id:	NV4000000004274		

Z230
ENE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004277**

Well log:	104642	App:	Not Reported
Notice of :	31822	Waiver no:	Not Reported
Date log r:	12/13/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CB

Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	Not Reported		
Parcel no:	179-07-201-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/30/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	53
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	55
Bottom per:	65	Perf inter:	1
Static wl:	48.7		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2148	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/28/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	07/30/2007
Gravel p 1:	53	Gravel p 2:	65
Utm x:	680959.091671		
Utm y:	3991099.30945		
Site id:	NV4000000004277		

Z231
ENE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004276**

Well log:	104508	App:	Not Reported
Notice of :	31825	Waiver no:	Not Reported
Date log r:	12/13/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CB

Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	AA-UW-04		
Parcel no:	179-07-701-012	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/06/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	31
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	4		
Csng reduc:	0	Top perf:	35
Bottom per:	55	Perf inter:	1
Static wl:	39.59		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2148	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/10/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	08/06/2007
Gravel p 1:	31	Gravel p 2:	55
Utm x:	680959.091671		
Utm y:	3991099.30945		
Site id:	NV4000000004276		

AA232
SSE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003393**

Well log:	96746	App:	Not Reported
Notice of :	26911	Waiver no:	Not Reported
Date log r:	05/24/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	AD

Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	ATLANTIC AVE & W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	178-13-601-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/19/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	60
Depth dril:	97	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	97
Csng diame:	2		
Csng reduc:	0	Top perf:	67
Bottom per:	97	Perf inter:	1
Static wl:	72		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	5115 S INDUSTRIAL RD #104 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/20/2005
Update use:	Not Reported	Date updat:	05/22/2000
Edit statu:	F	Well start:	05/19/2005
Gravel p 1:	60	Gravel p 2:	97
Utm x:	680588.51363		
Utm y:	3989642.75282		
Site id:	NV4000000003393		

AA233
SSE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003394**

Well log:	96747	App:	Not Reported
Notice of :	26911	Waiver no:	Not Reported
Date log r:	05/24/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	ATLANTIC AVE & W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	178-13-601-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/19/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	70	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	70
Csng diame:	2		
Csng reduc:	0	Top perf:	45
Bottom per:	70	Perf inter:	1
Static wl:	53		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	5115 S INDUSTRIAL RD #104 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/20/2005
Update use:	Not Reported	Date updat:	05/22/2000
Edit statu:	F	Well start:	05/19/2005
Gravel p 1:	40	Gravel p 2:	70
Utm x:	680588.51363		
Utm y:	3989642.75282		
Site id:	NV4000000003394		

Z234
ENE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004278**

Well log:	66759	App:	Not Reported
Notice of :	8715	Waiver no:	MO-403
Date log r:	06/20/1992	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CB
Legal quar:	NW SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	CITY OF HENDERSON		
Owner addr:	240 WATER ST HENDERSON NV		
Owner no:	MW-09		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/19/1991	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	55	Perf inter:	1
Static wl:	44		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/24/1997
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	04/18/1991
Gravel p 1:	39	Gravel p 2:	55
Utm x:	680984.116849		
Utm y:	3991099.82605		
Site id:	NV4000000004278		

AB235
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004399**

Well log:	27250	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	Not Reported
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	I		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/27/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	21
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	47
Csng diame:	8		
Csng reduc:	0	Top perf:	32
Bottom per:	42	Perf inter:	1
Static wl:	31		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	08/26/1983
Gravel p 1:	21	Gravel p 2:	45

Utm x:	679378.72487
Utm y:	3991251.79704
Site id:	NV4000000004399

AB236
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004389**

Well log:	96690	App:	Not Reported
Notice of :	27832	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-09		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/26/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/25/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004389		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AB237 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004390**

Well log:	96691	App:	Not Reported
Notice of :	27831	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-09		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	DBRANTLEY	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/24/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004390		

AB238 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004391**

Well log:	96692	App:	Not Reported
Notice of :	27830	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-08		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/22/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004391		

AB239
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004386**

Well log:	79223	App:	Not Reported
Notice of :	19939	Waiver no:	Not Reported
Date log r:	03/14/2000	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC

Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-201-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/02/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	40.3		
Temperatur:	78		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	48704		
Contract 1:	A D A COMPLIANCE CORP		
Contract 2:	3915 W HACIENDA AVE STE A-111 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	2021	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/2000
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	11/01/1999
Gravel p 1:	26	Gravel p 2:	50
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004386		

AB240
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004387**

Well log:	79224	App:	Not Reported
Notice of :	19938	Waiver no:	Not Reported
Date log r:	03/14/2000	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-201-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	5
Depth dril:	55	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	40.3		
Temperatur:	78		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	48704		
Contract 1:	A D A COMPLIANCE CORP		
Contract 2:	3915 W HACIENDA AVE STE A-111 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	2021	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/2000
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	11/01/1999
Gravel p 1:	26	Gravel p 2:	50
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004387		

AB241
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004388**

Well log:	96687	App:	Not Reported
Notice of :	27835	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-13		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/03/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	03/02/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004388		

AB242
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004392**

Well log:	96695	App:	Not Reported
Notice of :	27827	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-05		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/18/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/17/2005
Gravel p 1:	35	Gravel p 2:	60

Utm x:	679353.700304
Utm y:	3991251.28501
Site id:	NV4000000004392

AB243
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004396**

Well log:	96706	App:	Not Reported
Notice of :	27118	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-14		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/02/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/01/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004396		

Map ID
Direction
Distance
Elevation

Database	EDR ID Number
NV WELLS	**NV4000000004397**

AB244
NW
1/2 - 1 Mile
Lower

Well log:	107356	App:	Not Reported
Notice of :	63206	Waiver no:	Not Reported
Date log r:	10/09/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	8000 W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	178-12-201-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/24/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	29
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	6		
Csng reduc:	0	Top perf:	31
Bottom per:	51	Perf inter:	1
Static wl:	29		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2234	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/20/2009
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	09/23/2008
Gravel p 1:	29	Gravel p 2:	55
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004397		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AB245 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004398**

Well log:	108488	App:	Not Reported
Notice of :	61795	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX L L C		
Owner addr:	S OF WARM SPRINGS RD & E OF EASTGATE RD		
Owner no:	Not Reported		
Parcel no:	178-12-201-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/14/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	12
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	45
Csng diame:	2.375		
Csng reduc:	0	Top perf:	22
Bottom per:	42	Perf inter:	1
Static wl:	35		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	05/06/2009
Gravel p 1:	17	Gravel p 2:	43
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004398		

AB246 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004393**

Well log:	96696	App:	Not Reported
Notice of :	27826	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-04		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/17/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/16/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004393		

AB247
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004394**

Well log:	96700	App:	Not Reported
Notice of :	27124	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC

Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-20		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/10/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/09/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004394		

AB248
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004395**

Well log:	96701	App:	Not Reported
Notice of :	27123	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-19		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/09/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/08/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	679353.700304		
Utm y:	3991251.28501		
Site id:	NV4000000004395		

249
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004533**

Well log:	89630	App:	Not Reported
Notice of :	24812	Waiver no:	Not Reported
Date log r:	06/09/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	B
Legal quar:	NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	PIONEER AMERICAS LLC		
Owner addr:	8000 LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/09/2003	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	5
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2		
Csng reduc:	0	Top perf:	23
Bottom per:	33	Perf inter:	28
Static wl:	26		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54243		
Contract 1:	BUDGET DRILLING CO		
Contract 2:	P O BOX 3505 PAHRUMP NV 89041		
Contract 3:	0		
Driller li:	2229	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/11/2003
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	05/22/2003
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679550.109772		
Utm y:	3991440.27259		
Site id:	NV4000000004533		

AC250
NE
1/2 - 1 Mile
Lower

FED USGS **USGS3088830**

Agency cd:	USGS	Site no:	360308114592701
Site name:	212 S22 E63 07BCBD1 USBR LG025		
Latitude:	360305	EDR Site id:	USGS3088830
Longitude:	1145930	Dec lat:	36.05136502
Dec lon:	-114.9924932	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWSWNWS07 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1738.59		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19700101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	16.	Hole depth:	24.
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1972-03-02	Ground water data end date:	1986-11-22
Ground water data count:	81		

Ground-water levels, Number of Measurements: 81

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1986-11-22					

Note: The site was dry (no water level recorded).

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1986-10-29					
Note: The site was dry (no water level recorded).					
1986-09-29					
Note: The site was dry (no water level recorded).					
1986-07-16					
Note: The site was dry (no water level recorded).					
1986-06-29	14.65		1986-06-18	13.74	
1986-04-14	13.62		1986-04-07	14.20	
1986-03-11	14.10		1986-02-10	15.40	
1986-01-10	15.40		1985-12-11	15.40	
1985-09-24	15.70		1985-08-14	15.00	
1985-07-22	13.90		1985-06-17	11.50	
1985-05-21	11.20		1985-04-24	10.40	
1985-03-20	10.00		1985-02-19	9.90	
1985-01-23	9.70		1984-12-17	9.40	
1984-11-27	8.60		1984-10-19	8.90	
1984-09-24	8.40		1984-08-29	8.20	
1984-07-25	10.10		1984-06-20	9.40	
1984-05-22	9.30		1984-04-25	11.32	
1984-03-22	11.04		1984-03-01	11.16	
1984-02-02	10.75		1983-12-08	10.84	
1983-11-10	10.37		1983-10-04	8.73	
1983-09-13	9.98		1983-08-04	10.42	
1983-07-13	11.03		1982-09-08	10.29	
1982-08-05	11.04		1982-07-01	10.22	
1982-06-02	10.21		1982-05-06	10.60	
1982-04-08	10.08		1982-03-15	10.08	
1982-02-04	10.01		1982-01-06	10.17	
1981-12-01	9.81		1981-11-05	10.02	
1981-10-06	9.50		1981-09-16	9.48	
1981-08-20	9.88		1981-07-07	9.33	
1981-06-12	8.91		1981-05-05	11.73	
1981-04-16	10.91		1981-03-10	9.28	
1981-02-20	10.82		1981-01-05	11.00	
1980-12-16	9.44		1980-11-05	8.60	
1980-07-03	11.73		1980-06-02	12.06	
1980-05-05	12.16		1980-04-02	11.32	
1980-03-03	11.38		1980-02-12	11.42	
1980-01-02	10.83		1979-12-03	12.54	
1979-11-15	13.43		1979-10-01	13.18	
1979-09-04	12.76		1979-08-07	12.44	
1979-07-02	12.89		1979-02-28	9.64	
1978-03-11	11		1977-03-07	10	
1976-03-04	10		1973-03-05	7	
1972-03-02	11				

AC251
NE
1/2 - 1 Mile
Lower

FED USGS **USGS3088829**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Agency cd:	USGS	Site no:	360307114592601
Site name:	212 S22 E63 07BCBD2 USBR LG026		
Latitude:	360305	EDR Site id:	USGS3088829
Longitude:	1145930	Dec lat:	36.05136502
Dec lon:	-114.9924932	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWSWNWS07 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1738.30		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19700101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	91.	Hole depth:	100.
Source of depth data:	other reported		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1972-03-02	Ground water data end date:	1987-06-26
Ground water data count:	85		

Ground-water levels, Number of Measurements: 85

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-26	21.26		1987-03-27	20.46	
1986-12-23	20.37		1986-11-21	20.38	
1986-10-29					
Note: The site was dry (no water level recorded).					
1986-10-23	20.05				
1986-09-29					
Note: The site was dry (no water level recorded).					
1986-08-12	18.54				
1986-07-16					
Note: The site was dry (no water level recorded).					
1986-06-29	15.34		1986-06-18	14.48	
1986-04-14	14.37		1986-04-07	14.70	
1986-03-11	14.80		1986-02-10	16.00	
1986-01-10	16.10		1985-12-11	18.23	
1985-09-24	17.10		1985-08-14	15.30	
1985-07-22	14.10		1985-06-17	11.70	
1985-05-21	11.40		1985-04-24	10.60	
1985-03-20	10.30		1985-02-19	10.20	
1985-01-23	10.00		1984-12-17	9.70	
1984-11-27	9.00		1984-10-19	9.30	
1984-09-24	8.80		1984-08-29	8.80	
1984-07-25	10.50		1984-06-20	10.10	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1984-05-22	10.10	
1984-03-22	11.53	
1984-01-23	11.19	
1983-11-10	10.92	
1983-09-13	10.67	
1983-07-13	12.07	
1982-08-05	11.82	
1982-06-02	11.18	
1982-04-08	11.00	
1982-02-04	10.51	
1981-12-01	10.71	
1981-10-06	10.36	
1981-08-20	10.57	
1981-06-12	10.13	
1981-04-16	11.32	
1981-02-20	11.47	
1980-12-16	10.00	
1980-07-03	12.31	
1980-05-05	12.41	
1980-03-03	11.71	
1980-01-02	10.22	
1979-11-15	13.62	
1979-09-04	12.74	
1979-07-03	13.07	
1977-03-07	12	
1973-03-05	7	
1984-04-25	11.71	
1984-02-27	11.54	
1983-12-08	11.29	
1983-10-04	10.64	
1983-08-04	11.37	
1982-09-08	11.17	
1982-07-01	11.28	
1982-05-06	11.05	
1982-03-15	10.52	
1982-01-06	10.84	
1981-11-05	10.56	
1981-09-16	10.39	
1981-07-07	10.51	
1981-05-05	12.04	
1981-03-10	10.50	
1981-01-05	9.60	
1980-11-05	9.52	
1980-06-02	12.75	
1980-04-02	11.76	
1980-02-12	12.06	
1979-12-03	13.14	
1979-10-01	13.37	
1979-08-07	12.70	
1978-03-11	13	
1976-03-04	10.55	
1972-03-02	12	

AD252
SE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003540**

Well log:	98847	App:	Not Reported
Notice of :	28680	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/10/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	57
Depth dril:	87	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	87
Csng diame:	4		
Csng reduc:	0	Top perf:	57
Bottom per:	87	Perf inter:	1
Static wl:	71.15		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2006
Update use:	DBRANTLEY	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/10/2005
Gravel p 1:	55	Gravel p 2:	87
Utm x:	680985.16718		
Utm y:	3989835.89693		
Site id:	NV4000000003540		

AD253
SE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003541**

Well log:	103355	App:	Not Reported
Notice of :	30958	Waiver no:	Not Reported
Date log r:	05/31/2007	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	LAKE MEAD CROSSING LLC		
Owner addr:	110 W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/24/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	90
Csng diame:	2		
Csng reduc:	0	Top perf:	40
Bottom per:	90	Perf inter:	1
Static wl:	70.4		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	4255 W POST RD LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1944	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/11/2007
Update use:	Not Reported	Date updat:	05/09/2006
Edit statu:	F	Well start:	05/24/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680985.16718		
Utm y:	3989835.89693		
Site id:	NV4000000003541		

AE254
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004638**

Well log:	80555	App:	Not Reported
Notice of :	21903	Waiver no:	Not Reported
Date log r:	08/11/2000	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-12-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/01/2000	Date cmplt:	M
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	48704		
Contract 1:	A D A COMPLIANCE CORP		
Contract 2:	3915 W HACIENDA AVE STE A-111 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	08/16/2000
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	08/01/2000
Gravel p 1:	0	Gravel p 2:	0
Utm x:	680146.254014		
Utm y:	3991668.29961		
Site id:	NV4000000004638		

AE255
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004639**

Well log:	80556	App:	Not Reported
Notice of :	21946	Waiver no:	Not Reported
Date log r:	08/11/2000	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-12-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/07/2000	Date cmplt:	D
Gravel pac:	Y	Depth seal:	8
Depth dril:	22	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	22
Csng diame:	2		
Csng reduc:	0	Top perf:	12
Bottom per:	22	Perf inter:	0
Static wl:	13		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	48704		
Contract 1:	A D A COMPLIANCE CORP		
Contract 2:	3915 W HACIENDA AVE STE A-111 LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	08/16/2000
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	08/07/2000
Gravel p 1:	8	Gravel p 2:	22

Utm x:	680146.254014
Utm y:	3991668.29961
Site id:	NV4000000004639

AE256
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004642**

Well log:	71386	App:	Not Reported
Notice of :	17410	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/06/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	9
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	6.5		
Csng reduc:	0	Top perf:	14
Bottom per:	55	Perf inter:	1
Static wl:	19		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/28/1998
Update use:	user15	Date updat:	06/04/1998
Edit statu:	F	Well start:	05/06/1998
Gravel p 1:	11	Gravel p 2:	55
Utm x:	680171.277476		
Utm y:	3991668.81395		
Site id:	NV4000000004642		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AE257 **North** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004641**

Well log:	71385	App:	Not Reported
Notice of :	17410	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/06/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	10
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	2.25		
Csng reduc:	0	Top perf:	15
Bottom per:	60	Perf inter:	1
Static wl:	19		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/28/1998
Update use:	user15	Date updat:	06/04/1998
Edit statu:	F	Well start:	04/06/1998
Gravel p 1:	12	Gravel p 2:	60
Utm x:	680171.277476		
Utm y:	3991668.81395		
Site id:	NV4000000004641		

AE258 **North** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004640**

Well log:	71382	App:	Not Reported
Notice of :	17419	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/30/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	6
Depth dril:	42	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	42
Csng diame:	2.25		
Csng reduc:	0	Top perf:	12
Bottom per:	42	Perf inter:	1
Static wl:	13		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/28/1998
Update use:	user15	Date updat:	06/04/1998
Edit statu:	F	Well start:	04/30/1998
Gravel p 1:	10	Gravel p 2:	42
Utm x:	680171.277476		
Utm y:	3991668.81395		
Site id:	NV4000000004640		

AE259
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004645**

Well log:	71389	App:	Not Reported
Notice of :	17410	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB

Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/21/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	11
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.25		
Csng reduc:	0	Top perf:	15
Bottom per:	50	Perf inter:	1
Static wl:	18		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/29/1998
Update use:	Not Reported	Date updat:	06/04/1998
Edit statu:	F	Well start:	04/21/1998
Gravel p 1:	13	Gravel p 2:	50
Utm x:	680171.277476		
Utm y:	3991668.81395		
Site id:	NV4000000004645		

AE260
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004644**

Well log:	71388	App:	Not Reported
Notice of :	17410	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/04/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	8
Depth dril:	35	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2.25		
Csng reduc:	0	Top perf:	13
Bottom per:	35	Perf inter:	1
Static wl:	18		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/29/1998
Update use:	Not Reported	Date updat:	06/04/1998
Edit statu:	F	Well start:	05/04/1998
Gravel p 1:	11	Gravel p 2:	35
Utm x:	680171.277476		
Utm y:	3991668.81395		
Site id:	NV4000000004644		

AE261
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004643**

Well log:	71387	App:	Not Reported
Notice of :	17410	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	AB
Legal quar:	NW NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/04/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	6
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2.25		
Csng reduc:	0	Top perf:	10
Bottom per:	35	Perf inter:	1
Static wl:	16		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/29/1998
Update use:	Not Reported	Date updat:	06/04/1998
Edit statu:	F	Well start:	05/04/1998
Gravel p 1:	8	Gravel p 2:	35
Utm x:	680171.277476		
Utm y:	3991668.81395		
Site id:	NV4000000004643		

AF262
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003833**

Well log:	36999	App:	Not Reported
Notice of :	2754	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-075		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/26/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	44
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	48
Bottom per:	58	Perf inter:	1
Static wl:	51		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	03/12/2008
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/26/1989
Gravel p 1:	44	Gravel p 2:	65

Utm x:	678994.6883
Utm y:	3990442.42754
Site id:	NV4000000003833

AF263
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003832**

Well log:	36998	App:	Not Reported
Notice of :	2753	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-074		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/26/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	42
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	47
Bottom per:	57	Perf inter:	1
Static wl:	52		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	03/12/2008
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/26/1989
Gravel p 1:	42	Gravel p 2:	65
Utm x:	678994.6883		
Utm y:	3990442.42754		
Site id:	NV4000000003832		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AF264 **West** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000003835**

Well log:	75413	App:	Not Reported
Notice of :	17567	Waiver no:	Not Reported
Date log r:	04/08/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	AMERICAN PACIFIC CORP		
Owner addr:	5857 E FLAMINGO RD		
Owner no:	Not Reported		
Parcel no:	178-11-801-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/12/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	0
Depth dril:	34	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	34
Csng diame:	2		
Csng reduc:	0	Top perf:	19
Bottom per:	34	Perf inter:	1
Static wl:	21		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2044	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/12/1998
Gravel p 1:	17	Gravel p 2:	34
Utm x:	678994.6883		
Utm y:	3990442.42754		
Site id:	NV4000000003835		

AF265 **West** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000003834**

Well log:	64767	App:	Not Reported
Notice of :	17268	Waiver no:	Not Reported
Date log r:	04/25/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR ALKALI CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-14-302-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/17/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	38
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4.5		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	46		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/29/1997
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	03/17/1997
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678994.6883		
Utm y:	3990442.42754		
Site id:	NV4000000003834		

266
SSE
1/2 - 1 Mile
Higher

FED USGS **USGS3088798**

Agency cd:	USGS	Site no:	360205114594701
Site name:	212 S22 E62 13ADCD1 USBR PG276		
Latitude:	360205	EDR Site id:	USGS3088798
Longitude:	1145947	Dec lat:	36.03469868
Dec lon:	-114.99721501	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSENES13 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1895.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19860927	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	95.	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1987-01-18
Water quality data end date:	1987-01-18	Water quality data count:	1
Ground water data begin date:	1986-09-27	Ground water data end date:	1987-06-24
Ground water data count:	9		

Ground-water levels, Number of Measurements: 18

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-24	84.86		1987-06-24	84.86	
1987-05-18	84.45		1987-05-18	84.45	
1987-04-29	84.46		1987-04-29	84.46	
1987-03-23	84.27		1987-03-23	84.27	
1987-02-26	84.24		1987-02-26	84.24	
1987-01-18	83.69		1987-01-18	83.69	
1986-11-17	83.60		1986-11-17	83.60	
1986-11-05	83.02		1986-11-05	83.02	
1986-09-27	82.89		1986-09-27	82.89	

AC267
NE
1/2 - 1 Mile
Lower

FED USGS **USGS3088828**

Agency cd:	USGS	Site no:	360304114592601
Site name:	212 S22 E63 07BCAC1 USBR PG279		
Latitude:	360304	EDR Site id:	USGS3088828
Longitude:	1145926	Dec lat:	36.05108727
Dec lon:	-114.99138204	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NESWNWS07 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1748.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19870106	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	30.	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1987-01-17
Water quality data end date:	1987-01-17	Water quality data count:	1
Ground water data begin date:	1987-01-06	Ground water data end date:	1987-06-24
Ground water data count:	7		

Ground-water levels, Number of Measurements: 7

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-24	28.16		1987-05-17	27.78	
1987-04-23	27.77		1987-03-23	27.42	
1987-02-26	27.26		1987-01-16	26.62	
1987-01-06	26.94				

AF268
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003825**

Well log:	104897	App:	Not Reported
Notice of :	33249	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD

Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	02		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	91	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/11/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/28/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003825		

AF269
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003826**

Well log:	104898	App:	Not Reported
Notice of :	33249	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	03		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	53	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	52
Csng diame:	4		
Csng reduc:	0	Top perf:	10
Bottom per:	52	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/11/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/28/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003826		

AF270
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003824**

Well log:	104896	App:	Not Reported
Notice of :	33249	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	01		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	150	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	149
Csng diame:	4		
Csng reduc:	0	Top perf:	10
Bottom per:	149	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/11/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/28/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003824		

AF271
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003822**

Well log:	104894	App:	Not Reported
Notice of :	33248	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	01		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/07/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	10
Bottom per:	64	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/11/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/25/2008
Gravel p 1:	0	Gravel p 2:	0

Utm x:	678969.661466
Utm y:	3990441.9167
Site id:	NV4000000003822

AF272
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003823**

Well log:	104895	App:	Not Reported
Notice of :	33248	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	02		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/07/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4		
Csng reduc:	0	Top perf:	10
Bottom per:	64	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/11/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/25/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003823		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AF273
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003830**

Well log:	104931	App:	Not Reported
Notice of :	33251	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	04		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	10		
Csng reduc:	0	Top perf:	5
Bottom per:	27	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/12/2008
Update use:	SGARDELLA	Date updat:	03/19/2008
Edit statu:	F	Well start:	02/25/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003830		

AF274
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003831**

Well log:	104932	App:	Not Reported
Notice of :	33250	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	01		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	8		
Csng reduc:	0	Top perf:	10
Bottom per:	54	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/12/2008
Update use:	SGARDELLA	Date updat:	03/12/2008
Edit statu:	F	Well start:	01/28/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003831		

AF275
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003829**

Well log:	104930	App:	Not Reported
Notice of :	33251	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD

Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	03		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	10		
Csng reduc:	0	Top perf:	5
Bottom per:	27	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/12/2008
Update use:	SGARDELLA	Date updat:	03/19/2008
Edit statu:	F	Well start:	02/25/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003829		

AF276
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003827**

Well log:	104928	App:	Not Reported
Notice of :	33251	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	01		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	0
Csng diame:	10		
Csng reduc:	0	Top perf:	5
Bottom per:	27	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/12/2008
Update use:	SGARDELLA	Date updat:	03/12/2008
Edit statu:	F	Well start:	02/25/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003827		

AF277
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003828**

Well log:	104929	App:	Not Reported
Notice of :	33251	Waiver no:	Not Reported
Date log r:	03/05/2008	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	02		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/25/2008	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	10		
Csng reduc:	0	Top perf:	5
Bottom per:	27	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2272	Source age:	NV003
User id:	SGARDELLA	Date entry:	03/12/2008
Update use:	SGARDELLA	Date updat:	03/12/2008
Edit statu:	F	Well start:	02/25/2008
Gravel p 1:	0	Gravel p 2:	0
Utm x:	678969.661466		
Utm y:	3990441.9167		
Site id:	NV4000000003828		

AG278
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004631**

Well log:	75387	App:	Not Reported
Notice of :	18602	Waiver no:	Not Reported
Date log r:	05/24/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/23/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	38
Depth dril:	69	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	69
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	69	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/23/1999
Gravel p 1:	38	Gravel p 2:	69

Utm x:	679770.902232
Utm y:	3991660.59306
Site id:	NV4000000004631

AG279
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004632**

Well log:	75389	App:	Not Reported
Notice of :	18602	Waiver no:	Not Reported
Date log r:	05/24/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/24/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	38
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	70	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/23/1999
Gravel p 1:	38	Gravel p 2:	70
Utm x:	679770.902232		
Utm y:	3991660.59306		
Site id:	NV4000000004632		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AG280 **NNW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004629**

Well log:	71398	App:	Not Reported
Notice of :	17412	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/24/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	10
Depth dril:	30	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	30
Csng diame:	2.25		
Csng reduc:	0	Top perf:	15
Bottom per:	30	Perf inter:	1
Static wl:	23		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/29/1998
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/24/1998
Gravel p 1:	12	Gravel p 2:	30
Utm x:	679770.902232		
Utm y:	3991660.59306		
Site id:	NV4000000004629		

AG281 **NNW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004630**

Well log:	71399	App:	Not Reported
Notice of :	17412	Waiver no:	Not Reported
Date log r:	05/26/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	210-110-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/23/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	8
Depth dril:	32	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	32
Csng diame:	2.25		
Csng reduc:	0	Top perf:	16
Bottom per:	32	Perf inter:	1
Static wl:	18		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	KCOON	Date entry:	05/29/1998
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/23/1998
Gravel p 1:	12	Gravel p 2:	32
Utm x:	679770.902232		
Utm y:	3991660.59306		
Site id:	NV4000000004630		

AG282
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004633**

Well log:	75390	App:	Not Reported
Notice of :	18602	Waiver no:	Not Reported
Date log r:	05/24/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA

Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/25/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	38
Depth dril:	67	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	67
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	67	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/24/1999
Gravel p 1:	38	Gravel p 2:	67
Utm x:	679770.902232		
Utm y:	3991660.59306		
Site id:	NV4000000004633		

AG283
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004636**

Well log:	75393	App:	Not Reported
Notice of :	18602	Waiver no:	Not Reported
Date log r:	05/24/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/01/1999	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	57	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	57
Csng diame:	4		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	43		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/31/1999
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679770.902232		
Utm y:	3991660.59306		
Site id:	NV4000000004636		

AG284
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004637**

Well log:	75394	App:	Not Reported
Notice of :	18602	Waiver no:	Not Reported
Date log r:	05/24/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/20/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	33
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	4		
Csng reduc:	0	Top perf:	35
Bottom per:	70	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	04/20/1999
Gravel p 1:	33	Gravel p 2:	70
Utm x:	679770.902232		
Utm y:	3991660.59306		
Site id:	NV4000000004637		

AG285
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004634**

Well log:	75391	App:	Not Reported
Notice of :	18602	Waiver no:	Not Reported
Date log r:	05/24/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/26/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	48
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	4		
Csng reduc:	0	Top perf:	50
Bottom per:	70	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/25/1999
Gravel p 1:	48	Gravel p 2:	70

Utm x:	679770.902232
Utm y:	3991660.59306
Site id:	NV4000000004634

AG286
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004635**

Well log:	75392	App:	Not Reported
Notice of :	18602	Waiver no:	Not Reported
Date log r:	05/24/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TIMET		
Owner addr:	8100 LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-13-101-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/30/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	38
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	65	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	41809		
Contract 1:	VERDE DRILLING		
Contract 2:	301 W DEER VALLEY RD #7 PHOENIX AZ 85027		
Contract 3:	0		
Driller li:	2070	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/14/1999
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	03/30/1999
Gravel p 1:	38	Gravel p 2:	40
Utm x:	679770.902232		
Utm y:	3991660.59306		
Site id:	NV4000000004635		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AH287
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003589**

Well log:	73938	App:	Not Reported
Notice of :	38804	Waiver no:	MO-2743
Date log r:	02/12/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	B
Legal quar:	NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	SHELL OIL CO		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	MW-06		
Parcel no:	179-18-204-009	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/09/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	57
Depth dril:	80	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	80
Csng diame:	4.5		
Csng reduc:	0	Top perf:	60
Bottom per:	80	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2018	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/08/1999
Update use:	dsdavis	Date updat:	04/22/1999
Edit statu:	F	Well start:	10/09/1997
Gravel p 1:	57	Gravel p 2:	80
Utm x:	681205.969363		
Utm y:	3990056.25283		
Site id:	NV4000000003589		

AH288
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003588**

Well log:	73937	App:	Not Reported
Notice of :	38804	Waiver no:	MO-2743
Date log r:	02/12/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	B
Legal quar:	NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	SHELL OIL CO		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	MW-04		
Parcel no:	179-18-204-009	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/07/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	53
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	90
Csng diame:	4.5		
Csng reduc:	0	Top perf:	60
Bottom per:	90	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2018	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/08/1999
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	10/07/1997
Gravel p 1:	57	Gravel p 2:	90
Utm x:	681205.969363		
Utm y:	3990056.25283		
Site id:	NV4000000003588		

AH289
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003591**

Well log:	73940	App:	Not Reported
Notice of :	38797	Waiver no:	MO-2743
Date log r:	02/12/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	B

Legal quar:	NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	SHELL OIL CO		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	MW-07		
Parcel no:	179-18-204-009	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/04/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	60
Depth dril:	95	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	95
Csng diame:	4.5		
Csng reduc:	0	Top perf:	65
Bottom per:	95	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2018	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/08/1999
Update use:	Not Reported	Date updat:	04/22/1999
Edit statu:	F	Well start:	11/04/1998
Gravel p 1:	63	Gravel p 2:	95
Utm x:	681205.969363		
Utm y:	3990056.25283		
Site id:	NV4000000003591		

AH290
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003590**

Well log:	73939	App:	Not Reported
Notice of :	38804	Waiver no:	MO-2743
Date log r:	02/12/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	X	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	B
Legal quar:	NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	SHELL OIL CO		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	MW-05		
Parcel no:	179-18-204-009	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/08/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	57
Depth dril:	80	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	80
Csng diame:	4.5		
Csng reduc:	0	Top perf:	60
Bottom per:	80	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	38113		
Contract 1:	GREGG DRILLING & TESTING INC		
Contract 2:	2726 WALNUT AVE SIGNAL HILL CA 90806		
Contract 3:	0		
Driller li:	2018	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/08/1999
Update use:	dsdavis	Date updat:	04/22/1999
Edit statu:	F	Well start:	10/08/1997
Gravel p 1:	57	Gravel p 2:	80
Utm x:	681205.969363		
Utm y:	3990056.25283		
Site id:	NV4000000003590		

AG291
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004626**

Well log:	94671	App:	Not Reported
Notice of :	27344	Waiver no:	Not Reported
Date log r:	01/11/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-12-301-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/06/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	18
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2		
Csng reduc:	0	Top perf:	20
Bottom per:	40	Perf inter:	1
Static wl:	20		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	55860		
Contract 1:	T E N V WELL & ENVIRO SERVICES		
Contract 2:	1973 N NELLIS BLVD BOX 303 LAS VEGAS NV 89115		
Contract 3:	0		
Driller li:	1953	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/12/2005
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	12/06/2004
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679745.87879		
Utm y:	3991660.07986		
Site id:	NV4000000004626		

AG292
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004627**

Well log:	109149	App:	Not Reported
Notice of :	32373	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	N OF WARM SPRINGS & W OF BOULDER HWY		
Owner no:	M-152		
Parcel no:	178-12-110-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/05/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	121
Depth dril:	145	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	145
Csng diame:	2.375		
Csng reduc:	0	Top perf:	125
Bottom per:	145	Perf inter:	1
Static wl:	23		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	09/23/2009
Gravel p 1:	121	Gravel p 2:	145

Utm x:	679745.87879
Utm y:	3991660.07986
Site id:	NV4000000004627

AG293
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004628**

Well log:	109150	App:	Not Reported
Notice of :	32373	Waiver no:	Not Reported
Date log r:	10/26/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONX LLC		
Owner addr:	N OF WARM SPRINGS & W OF BOULDER HWY		
Owner no:	M-156		
Parcel no:	178-12-110-004	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/09/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	171
Depth dril:	195	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	195
Csng diame:	2.375		
Csng reduc:	0	Top perf:	175
Bottom per:	195	Perf inter:	1
Static wl:	19		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/02/2009
Update use:	Not Reported	Date updat:	07/10/1997
Edit statu:	F	Well start:	10/01/2009
Gravel p 1:	171	Gravel p 2:	195
Utm x:	679745.87879		
Utm y:	3991660.07986		
Site id:	NV4000000004628		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

294
West
1/2 - 1 Mile
Lower | **FED USGS** | **USGS3100102**

Agency cd:	USGS	Site no:	360243115005001
Site name:	212 S22 E62 11DAC 1 USBR LG032		
Latitude:	360243	EDR Site id:	USGS3100102
Longitude:	1150050	Dec lat:	36.04525369
Dec lon:	-115.01471581	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWNESES11 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1769.95		
Altitude method:	Unknown		
Altitude accuracy:	Not Reported		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	154	Hole depth:	155
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1971-04-29	Ground water data end date:	1980-04-04
Ground water data count:	31		

Ground-water levels, Number of Measurements: 31

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1980-04-04	48.16		1980-03-04	49.72	
1980-02-13	50.18		1979-10-02	50.28	
1973-12-03	43.80		1973-11-02	43.16	
1973-10-03	43.68		1973-09-07	43.80	
1973-08-03	44.15		1973-07-03	44.28	
1973-05-07	44.40		1973-04-10	44.58	
1973-02-09	44.55		1973-01-09	43.73	
1972-11-25	43.60		1972-10-25	43.89	
1972-09-24	43.40		1972-08-16	44.63	
1972-08-01	44.40		1972-07-18	43.69	
1972-06-20	44.02		1972-05-23	44.27	
1972-04-11	43.02		1972-03-02	43.54	
1972-01-04	42.51		1971-12-01	43.04	
1971-11-03	41.66		1971-08-31	41.00	
1971-06-09	40.70		1971-05-27	40.22	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1971-04-29	39.51				

AI295
East
1/2 - 1 Mile
Higher

NV WELLS **NV4000000004020**

Well log:	104641	App:	Not Reported
Notice of :	31823	Waiver no:	Not Reported
Date log r:	12/13/2007	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	Not Reported		
Parcel no:	179-07-701-012	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/03/2007	Date cmplt:	D
Gravel pac:	Y	Depth seal:	53
Depth dril:	75	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	75
Csng diame:	4		
Csng reduc:	0	Top perf:	55
Bottom per:	75	Perf inter:	1
Static wl:	65.57		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD = SONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2148	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/28/2008
Update use:	Not Reported	Date updat:	09/21/2000
Edit statu:	F	Well start:	07/31/2007
Gravel p 1:	53	Gravel p 2:	75

Utm x:	681368.419039
Utm y:	3990676.17387
Site id:	NV4000000004020

AJ296
NE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004547**

Well log:	93350	App:	Not Reported
Notice of :	26050	Waiver no:	Not Reported
Date log r:	06/09/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	B R C		
Owner addr:	BOULDER HWY & WARM SPRINGS RD		
Owner no:	01		
Parcel no:	179-07-201-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	325
Depth dril:	360	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	355
Csng diame:	4		
Csng reduc:	0	Top perf:	335
Bottom per:	355	Perf inter:	1
Static wl:	47		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	51765		
Contract 1:	PROSONIC CORP		
Contract 2:	419 E JUANITA #104 MESA AZ 95204		
Contract 3:	0		
Driller li:	1941	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/24/2004
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	05/15/2004
Gravel p 1:	330	Gravel p 2:	356

Utm x:	680950.822331
Utm y:	3991499.90411
Site id:	NV4000000004547

AJ297
NE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004546**

Well log:	93120	App:	Not Reported
Notice of :	24799	Waiver no:	Not Reported
Date log r:	05/10/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	WARM SPRINGS & PABCO RD		
Owner no:	BRC-SB01-A		
Parcel no:	179-07-201-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/07/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	400	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	49
Csng diame:	4.5		
Csng reduc:	0	Top perf:	29
Bottom per:	49	Perf inter:	1
Static wl:	43.1		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	1747	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/13/2004
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	04/03/2004
Gravel p 1:	23	Gravel p 2:	51
Utm x:	680950.822331		
Utm y:	3991499.90411		
Site id:	NV4000000004546		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AJ298
NE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004545**

Well log:	84819	App:	Not Reported
Notice of :	22712	Waiver no:	Not Reported
Date log r:	10/15/2001	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	875 W WARM SPRINGS		
Owner no:	BEC-01		
Parcel no:	179-07-201-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/15/2001	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	4		
Csng reduc:	0	Top perf:	25
Bottom per:	40	Perf inter:	1
Static wl:	30.35		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7560 W SAHARA AVE STE 101 LAS VEGAS NV 89117		
Contract 3:	0		
Driller li:	2107	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/12/2001
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	09/14/2001
Gravel p 1:	28	Gravel p 2:	40
Utm x:	680950.822331		
Utm y:	3991499.90411		
Site id:	NV4000000004545		

AJ299
NE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004550**

Well log:	94314	App:	Not Reported
Notice of :	26496	Waiver no:	Not Reported
Date log r:	07/22/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	027B		
Parcel no:	179-07-201-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/16/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	55
Depth dril:	143	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	82
Csng diame:	4		
Csng reduc:	0	Top perf:	62
Bottom per:	82	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1941	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/02/2004
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	07/16/2004
Gravel p 1:	59	Gravel p 2:	82
Utm x:	680950.822331		
Utm y:	3991499.90411		
Site id:	NV4000000004550		

AJ300
NE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004549**

Well log:	94313	App:	Not Reported
Notice of :	26496	Waiver no:	Not Reported
Date log r:	07/22/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	BC

Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	027A		
Parcel no:	179-07-201-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/15/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	355
Depth dril:	402	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	382
Csng diame:	4		
Csng reduc:	0	Top perf:	362
Bottom per:	382	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1941	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/02/2004
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	07/12/2004
Gravel p 1:	357	Gravel p 2:	382
Utm x:	680950.822331		
Utm y:	3991499.90411		
Site id:	NV4000000004549		

AJ301
NE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004548**

Well log:	93377	App:	Not Reported
Notice of :	26050	Waiver no:	Not Reported
Date log r:	06/09/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	B R C		
Owner addr:	BOULDER HWY & WARM SPRINGS RD		
Owner no:	02		
Parcel no:	179-07-201-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/21/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	52
Depth dril:	92	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	85
Csng diame:	4		
Csng reduc:	0	Top perf:	55
Bottom per:	85	Perf inter:	1
Static wl:	17.3		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	51765		
Contract 1:	PROSONIC CORP		
Contract 2:	419 E JUANITA #104 MESA AZ 95204		
Contract 3:	0		
Driller li:	1941	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/24/2004
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	05/21/2004
Gravel p 1:	54	Gravel p 2:	85
Utm x:	680950.822331		
Utm y:	3991499.90411		
Site id:	NV4000000004548		

AI302
East
1/2 - 1 Mile
Higher

NV WELLS **NV4000000004023**

Well log:	65067	App:	Not Reported
Notice of :	17834	Waiver no:	Not Reported
Date log r:	05/12/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	CIRCLE K STORES INC		
Owner addr:	450 N WATER ST HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	179-07-410-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/10/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	65	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4.25		
Csng reduc:	0	Top perf:	45
Bottom per:	65	Perf inter:	1
Static wl:	55		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	31386		
Contract 1:	WEST HAZMAT DRILLING CORP		
Contract 2:	1016 E KATELLA AVE ANAHEIM CA 92805		
Contract 3:	0		
Driller li:	2060	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/22/1997
Update use:	Not Reported	Date updat:	10/21/1996
Edit statu:	F	Well start:	04/08/1997
Gravel p 1:	42	Gravel p 2:	65
Utm x:	681393.44547		
Utm y:	3990676.69159		
Site id:	NV4000000004023		

AI303
East
1/2 - 1 Mile
Higher

NV WELLS **NV4000000004022**

Well log:	50057	App:	Not Reported
Notice of :	12594	Waiver no:	MO-2447
Date log r:	11/29/1995	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BROADBENT & ASSOCIATES		
Owner addr:	BOULDER HWY & WATER ST		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/1994	Date cmplt:	D
Gravel pac:	N	Depth seal:	68
Depth dril:	68	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	63		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	35639		
Contract 1:	B L WEBER GROUP INC (THE)		
Contract 2:	16825 S WEBER DR CHANDLER AZ 85226-4112		
Contract 3:	0		
Driller li:	1910	Source age:	NV003
User id:	DBRANTLEY	Date entry:	02/12/1996
Update use:	dsdavis	Date updat:	10/21/1996
Edit statu:	F	Well start:	05/20/1994
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681393.44547		
Utm y:	3990676.69159		
Site id:	NV4000000004022		

AI304
East
1/2 - 1 Mile
Higher

NV WELLS **NV4000000004021**

Well log:	45788	App:	Not Reported
Notice of :	12593	Waiver no:	MO-2447
Date log r:	09/15/1994	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BROADBENT & ASSOCIATES		
Owner addr:	BOULDER HWY & WATER ST		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/1994	Date cmplt:	D
Gravel pac:	N	Depth seal:	0
Depth dril:	68	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	63		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	35639		
Contract 1:	B L WEBER GROUP INC (THE)		
Contract 2:	16825 S WEBER DR CHANDLER AZ 85226-4112		
Contract 3:	0		
Driller li:	1910	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/21/1994
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/20/1994
Gravel p 1:	0	Gravel p 2:	0

Utm x:	681393.44547
Utm y:	3990676.69159
Site id:	NV4000000004021

AI305
East
1/2 - 1 Mile
Higher

NV WELLS **NV4000000004026**

Well log:	65070	App:	Not Reported
Notice of :	17834	Waiver no:	Not Reported
Date log r:	05/12/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	CIRCLE K STORES INC		
Owner addr:	450 N WATER ST HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	179-07-410-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/10/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4.25		
Csng reduc:	0	Top perf:	45
Bottom per:	65	Perf inter:	1
Static wl:	55		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	31386		
Contract 1:	WEST HAZMAT DRILLING CORP		
Contract 2:	1016 E KATELLA AVE ANAHEIM CA 92805		
Contract 3:	0		
Driller li:	2060	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/22/1997
Update use:	Not Reported	Date updat:	10/21/1996
Edit statu:	F	Well start:	04/08/1997
Gravel p 1:	42	Gravel p 2:	65
Utm x:	681393.44547		
Utm y:	3990676.69159		
Site id:	NV4000000004026		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AI306
East
1/2 - 1 Mile
Higher

NV WELLS **NV4000000004025**

Well log:	65069	App:	Not Reported
Notice of :	17834	Waiver no:	Not Reported
Date log r:	05/12/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	CIRCLE K STORES INC		
Owner addr:	450 N WATER ST HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	179-07-410-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/11/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4.25		
Csng reduc:	0	Top perf:	45
Bottom per:	65	Perf inter:	1
Static wl:	55		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	31386		
Contract 1:	WEST HAZMAT DRILLING CORP		
Contract 2:	1016 E KATELLA AVE ANAHEIM CA 92805		
Contract 3:	0		
Driller li:	2060	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/22/1997
Update use:	Not Reported	Date updat:	10/21/1996
Edit statu:	F	Well start:	04/09/1997
Gravel p 1:	42	Gravel p 2:	65
Utm x:	681393.44547		
Utm y:	3990676.69159		
Site id:	NV4000000004025		

AI307
East
1/2 - 1 Mile
Higher

NV WELLS **NV4000000004024**

Well log:	65068	App:	Not Reported
Notice of :	17834	Waiver no:	Not Reported
Date log r:	05/12/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	CIRCLE K STORES INC		
Owner addr:	450 N WATER ST HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	179-07-410-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/11/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	40
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4.25		
Csng reduc:	0	Top perf:	45
Bottom per:	65	Perf inter:	1
Static wl:	55		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	31386		
Contract 1:	WEST HAZMAT DRILLING CORP		
Contract 2:	1016 E KATELLA AVE ANAHEIM CA 92805		
Contract 3:	0		
Driller li:	2060	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/22/1997
Update use:	Not Reported	Date updat:	10/21/1996
Edit statu:	F	Well start:	04/09/1997
Gravel p 1:	42	Gravel p 2:	65
Utm x:	681393.44547		
Utm y:	3990676.69159		
Site id:	NV4000000004024		

AK308
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003763**

Well log:	103354	App:	Not Reported
Notice of :	30959	Waiver no:	Not Reported
Date log r:	05/31/2007	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BA

Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	LAKE MEAD CROSSING LLC		
Owner addr:	110 W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/24/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	2		
Csng reduc:	0	Top perf:	45
Bottom per:	70	Perf inter:	1
Static wl:	49.8		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	4255 W POST RD LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1944	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/11/2007
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/24/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681376.705197		
Utm y:	3990275.57931		
Site id:	NV4000000003763		

AK309
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003764**

Well log:	104362	App:	Not Reported
Notice of :	30955	Waiver no:	Not Reported
Date log r:	05/31/2007	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	LAKE MEAD CROSSING LLC		
Owner addr:	LAKE MEAD & WATER ST		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/24/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	70	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	70
Csng diame:	2		
Csng reduc:	0	Top perf:	45
Bottom per:	70	Perf inter:	1
Static wl:	57.8		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	4255 W POST RD LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1944	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/08/2008
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/24/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681376.705197		
Utm y:	3990275.57931		
Site id:	NV4000000003764		

AJ310
NE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004551**

Well log:	66763	App:	Not Reported
Notice of :	8711	Waiver no:	MO-403
Date log r:	07/20/1992	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	CITY OF HENDERSON		
Owner addr:	240 WATER ST HENDERSON NV		
Owner no:	MW-05		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	04/16/1991	Date cmplt:	D
Gravel pac:	Y	Depth seal:	31
Depth dril:	47	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	47
Csng diame:	2		
Csng reduc:	0	Top perf:	32
Bottom per:	47	Perf inter:	1
Static wl:	34		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1761	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/24/1997
Update use:	Not Reported	Date updat:	01/07/1997
Edit statu:	F	Well start:	04/16/1991
Gravel p 1:	31	Gravel p 2:	47
Utm x:	680975.846364		
Utm y:	3991500.42073		
Site id:	NV4000000004551		

AK311
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003765**

Well log:	52442	App:	Not Reported
Notice of :	17186	Waiver no:	Not Reported
Date log r:	07/01/1996	Date log 1:	M
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	U	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BA
Legal quar:	NE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	SECOR		
Owner addr:	BOULDER HWY & LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/24/2007	Date cmplt:	Not Reported
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	1847	Source age:	NV003
User id:	CRWAKEFI	Date entry:	08/16/1996
Update use:	dsdavis	Date updat:	10/02/1996
Edit statu:	F	Well start:	05/24/2007
Gravel p 1:	0	Gravel p 2:	0

Utm x: 681401.732773
Utm y: 3990276.09701
Site id: NV4000000003765

AL312
South
1/2 - 1 Mile
Higher

FED USGS **USGS3088795**

Agency cd:	USGS	Site no:	360158115000201
Site name:	212 S22 E62 13DBBD1 USBR		
Latitude:	360158	EDR Site id:	USGS3088795
Longitude:	1150002	Dec lat:	36.03275421
Dec lon:	-115.00138175	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNWSES13 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1895.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	92.	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1986-09-28	Ground water data end date:	1987-06-24
Ground water data count:	4		

Ground-water levels, Number of Measurements: 8

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-24					
Note: The site was dry (no water level recorded).					
1987-06-24					
Note: The site was dry (no water level recorded).					
1987-03-23					
Note: The site was dry (no water level recorded).					
1987-03-23					
Note: The site was dry (no water level recorded).					
1986-11-17					
Note: The site was dry (no water level recorded).					
1986-11-17					
Note: The site was dry (no water level recorded).					

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1986-09-28					
Note: The site was dry (no water level recorded).					
1986-09-28					
Note: The site was dry (no water level recorded).					

AL313
South
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003116**

Well log:	99035	App:	Not Reported
Notice of :	57839	Waiver no:	Not Reported
Date log r:	04/04/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-13-501-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/10/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	70
Depth dril:	107	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	102
Csng diame:	2		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	75		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORP		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	2311	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2006
Update use:	Not Reported	Date updat:	05/18/2004
Edit statu:	F	Well start:	03/10/2006
Gravel p 1:	70	Gravel p 2:	102

Utm x:	680196.274485
Utm y:	3989233.92348
Site id:	NV4000000003116

AL314
South
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003117**

Well log:	99036	App:	Not Reported
Notice of :	57839	Waiver no:	Not Reported
Date log r:	04/04/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-13-501-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/11/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	130
Depth dril:	157	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	150
Csng diame:	2		
Csng reduc:	0	Top perf:	130
Bottom per:	150	Perf inter:	1
Static wl:	80		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORP		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	2311	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2006
Update use:	Not Reported	Date updat:	05/18/2004
Edit statu:	F	Well start:	03/11/2006
Gravel p 1:	130	Gravel p 2:	150
Utm x:	680196.274485		
Utm y:	3989233.92348		
Site id:	NV4000000003117		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

315
NNE
1/2 - 1 Mile
Lower | **FED USGS** | **USGS3088678**

Agency cd:	USGS	Site no:	360319114594001
Site name:	212 S22 E62 12AAAC1 USBR PG205		
Latitude:	360319	EDR Site id:	USGS3088678
Longitude:	1145940	Dec lat:	36.05525378
Dec lon:	-114.99527123	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NENENES12 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1704.11		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19820330
Date inventoried:	19860612	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	20.	Hole depth:	34.
Source of depth data:	driller		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1986-05-03
Water quality data end date:	1987-01-13	Water quality data count:	2
Ground water data begin date:	1984-01-26	Ground water data end date:	1987-06-19
Ground water data count:	122		

Ground-water levels, Number of Measurements: 244

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-19	11.38		1987-06-19	11.38	
1987-06-05	11.29		1987-06-05	11.29	
1987-05-29	11.21		1987-05-29	11.21	
1987-05-22	11.18		1987-05-22	11.18	
1987-05-08	11.17		1987-05-08	11.17	
1987-04-29	11.00		1987-04-29	11.00	
1987-04-22	10.91		1987-04-22	10.91	
1987-04-10	10.64		1987-04-10	10.64	
1987-04-03	10.56		1987-04-03	10.56	
1987-03-27	10.65		1987-03-27	10.65	
1987-03-20	10.89		1987-03-20	10.89	
1987-03-13	11.05		1987-03-13	11.05	
1987-03-06	11.08		1987-03-06	11.08	
1987-02-25	11.02		1987-02-25	11.02	
1987-02-06	10.83		1987-02-06	10.83	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1987-01-29	10.72	
1987-01-13	10.47	
1987-01-08	10.65	
1986-12-31	10.59	
1986-12-24	10.51	
1986-12-18	10.57	
1986-12-01	10.25	
1986-11-21	10.02	
1986-11-14	10.02	
1986-11-07	9.80	
1986-10-30	9.77	
1986-10-20	9.46	
1986-10-17	9.37	
1986-10-08	9.30	
1986-10-01	9.29	
1986-09-27	9.22	
1986-09-18	8.92	
1986-09-09	8.87	
1986-09-03	8.93	
1986-08-28	8.78	
1986-08-20	8.69	
1986-08-14	8.65	
1986-08-07	8.50	
1986-07-30	8.34	
1986-07-23	8.27	
1986-07-15	8.02	
1986-07-08	7.80	
1986-07-02	7.68	
1986-06-29	7.67	
1986-06-18	7.65	
1986-06-11	7.72	
1986-06-04	7.78	
1986-05-13	8.29	
1986-04-24	8.60	
1986-04-17	8.80	
1986-04-14	8.94	
1986-04-10	9.00	
1986-04-03	9.10	
1986-03-28	9.10	
1986-03-22	9.20	
1986-03-06	9.40	
1986-02-28	9.50	
1986-02-22	9.70	
1986-02-15	9.60	
1986-02-07	9.50	
1986-01-30	9.50	
1986-01-23	9.70	
1986-01-16	9.80	
1986-01-09	9.90	
1986-01-03	10.00	
1985-12-31	10.10	
1985-12-26	10.10	
1985-12-13	9.90	
1985-12-05	9.70	
1985-11-27	9.59	

Date	Feet below Surface	Feet to Sealevel
1987-01-29	10.72	
1987-01-13	10.47	
1987-01-08	10.65	
1986-12-31	10.59	
1986-12-24	10.51	
1986-12-18	10.57	
1986-12-01	10.25	
1986-11-21	10.02	
1986-11-14	10.02	
1986-11-07	9.80	
1986-10-30	9.77	
1986-10-20	9.46	
1986-10-17	9.37	
1986-10-08	9.30	
1986-10-01	9.29	
1986-09-27	9.22	
1986-09-18	8.92	
1986-09-09	8.87	
1986-09-03	8.93	
1986-08-28	8.78	
1986-08-20	8.69	
1986-08-14	8.65	
1986-08-07	8.50	
1986-07-30	8.34	
1986-07-23	8.27	
1986-07-15	8.02	
1986-07-08	7.80	
1986-07-02	7.68	
1986-06-29	7.67	
1986-06-18	7.65	
1986-06-11	7.72	
1986-06-04	7.78	
1986-05-13	8.29	
1986-04-24	8.60	
1986-04-17	8.80	
1986-04-14	8.94	
1986-04-10	9.00	
1986-04-03	9.10	
1986-03-28	9.10	
1986-03-22	9.20	
1986-03-06	9.40	
1986-02-28	9.50	
1986-02-22	9.70	
1986-02-15	9.60	
1986-02-07	9.50	
1986-01-30	9.50	
1986-01-23	9.70	
1986-01-16	9.80	
1986-01-09	9.90	
1986-01-03	10.00	
1985-12-31	10.10	
1985-12-26	10.10	
1985-12-13	9.90	
1985-12-05	9.70	
1985-11-27	9.59	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1985-11-22	9.47	
1985-11-14	9.35	
1985-11-07	9.23	
1985-11-01	9.12	
1985-10-25	8.94	
1985-10-18	8.75	
1985-10-11	8.45	
1985-10-04	8.28	
1985-09-27	8.10	
1985-09-20	7.97	
1985-09-13	7.78	
1985-09-06	7.67	
1985-08-30	7.40	
1985-08-23	7.21	
1985-08-16	6.93	
1985-08-09	6.72	
1985-08-02	6.59	
1985-07-26	6.49	
1985-07-25	6.58	
1985-07-16	6.25	
1985-07-09	5.94	
1985-07-06	5.94	
1985-07-05	5.94	
1985-07-03	5.94	
1985-07-02	5.93	
1985-07-01	5.96	
1985-06-29	5.96	
1985-06-28	5.96	
1985-06-27	5.97	
1985-06-26	5.96	
1985-06-25	5.78	
1985-06-24	5.95	
1985-06-23	5.95	
1985-06-21	5.97	
1985-06-17	5.90	
1985-06-17	5.97	
1985-05-21	6.11	
1985-04-24	5.82	
1985-03-29	5.72	
1985-01-30	5.61	
1984-12-17	5.64	
1984-11-27	5.46	
1984-10-22	5.59	
1984-09-25	5.41	
1984-08-22	5.25	
1984-07-16	4.40	
1984-06-21	4.80	
1984-05-21	4.90	
1984-04-17	5.00	
1984-03-20	4.90	
1984-02-14	5.00	
1984-01-26	4.90	

Date	Feet below Surface	Feet to Sealevel
1985-11-22	9.47	
1985-11-14	9.35	
1985-11-07	9.23	
1985-11-01	9.12	
1985-10-25	8.94	
1985-10-18	8.75	
1985-10-11	8.45	
1985-10-04	8.28	
1985-09-27	8.10	
1985-09-20	7.97	
1985-09-13	7.78	
1985-09-06	7.67	
1985-08-30	7.40	
1985-08-23	7.21	
1985-08-16	6.93	
1985-08-09	6.72	
1985-08-02	6.59	
1985-07-26	6.49	
1985-07-25	6.58	
1985-07-16	6.25	
1985-07-09	5.94	
1985-07-06	5.94	
1985-07-05	5.94	
1985-07-03	5.94	
1985-07-02	5.93	
1985-07-01	5.96	
1985-06-29	5.96	
1985-06-28	5.96	
1985-06-27	5.97	
1985-06-26	5.96	
1985-06-25	5.78	
1985-06-24	5.95	
1985-06-23	5.95	
1985-06-21	5.97	
1985-06-17	5.97	
1985-06-17	5.90	
1985-05-21	6.11	
1985-04-24	5.82	
1985-03-29	5.72	
1985-01-30	5.61	
1984-12-17	5.64	
1984-11-27	5.46	
1984-10-22	5.59	
1984-09-25	5.41	
1984-08-22	5.25	
1984-07-16	4.40	
1984-06-21	4.80	
1984-05-21	4.90	
1984-04-17	5.00	
1984-03-20	4.90	
1984-02-14	5.00	
1984-01-26	4.90	

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AM316
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004623**

Well log:	27247	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	F		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/25/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	25
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	53
Csng diame:	8		
Csng reduc:	0	Top perf:	28
Bottom per:	48	Perf inter:	1
Static wl:	30		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	08/24/1983
Gravel p 1:	25	Gravel p 2:	55
Utm x:	679370.527322		
Utm y:	3991652.39048		
Site id:	NV4000000004623		

AM317
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004622**

Well log:	27246	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	E		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/24/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	22
Depth dril:	49	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	49
Csng diame:	8		
Csng reduc:	0	Top perf:	27
Bottom per:	42	Perf inter:	1
Static wl:	30		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	08/23/1983
Gravel p 1:	22	Gravel p 2:	49
Utm x:	679370.527322		
Utm y:	3991652.39048		
Site id:	NV4000000004622		

AM318
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004625**

Well log:	27249	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	Not Reported
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	H		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/26/1985	Date cmplt:	D
Gravel pac:	Y	Depth seal:	22
Depth dril:	53	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	54
Csng diame:	8		
Csng reduc:	0	Top perf:	32
Bottom per:	47	Perf inter:	1
Static wl:	31		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/10/1997
Edit statu:	F	Well start:	08/26/1985
Gravel p 1:	22	Gravel p 2:	53
Utm x:	679370.527322		
Utm y:	3991652.39048		
Site id:	NV4000000004625		

AM319
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004624**

Well log:	27248	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	G		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/26/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	55	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	57
Csng diame:	8		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	31		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	08/13/1998
Edit statu:	F	Well start:	08/25/1983
Gravel p 1:	20	Gravel p 2:	55
Utm x:	679370.527322		
Utm y:	3991652.39048		
Site id:	NV4000000004624		

AN320
North
1/2 - 1 Mile
Lower

FED USGS **USGS3088682**

Agency cd:	USGS	Site no:	360324114595901
Site name:	212 S22 E62 01DCCD1 USBR PG103		
Latitude:	360324	EDR Site id:	USGS3088682
Longitude:	1145959	Dec lat:	36.05664255
Dec lon:	-115.00054926	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSWSES01 T22S R62E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1692.05		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19800506
Date inventoried:	19860612	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	9.	Hole depth:	16.
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

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Peak flow data count: 0
Water quality data end date: 1987-01-18
Ground water data begin date: 1980-05-06
Ground water data count: 87

Water quality data begin date: 1986-05-03
Water quality data count: 2
Ground water data end date: 1987-06-12

Ground-water levels, Number of Measurements: 174

Date	Feet below Surface	Feet to Sealevel
1987-06-12	6.13	
1987-04-15	6.16	
1987-01-18	5.75	
1986-12-29	6.20	
1986-12-22	6.12	
1986-12-01	6.17	
1986-11-12	6.17	
1986-11-04	6.16	
1986-10-28	6.07	
1986-10-21	6.14	
1986-10-15	6.10	
1986-10-08	6.06	
1986-10-01	5.95	
1986-09-28	5.96	
1986-09-16	6.04	
1986-09-09	5.99	
1986-09-04	5.99	
1986-08-28	6.00	
1986-08-20	5.93	
1986-08-13	5.95	
1986-08-06	6.06	
1986-07-30	6.03	
1986-07-23	6.01	
1986-07-15	6.00	
1986-07-08	6.04	
1986-07-01	6.17	
1986-06-18	6.03	
1986-06-11	6.04	
1986-06-02	6.09	
1986-05-20	6.05	
1986-04-15	6.05	
1986-04-08	6.00	
1986-03-11	6.00	
1986-02-10	5.80	
1986-01-11	6.00	
1985-12-09	5.90	
1985-12-03	5.87	
1985-09-27	5.81	
1985-08-15	5.61	
1985-07-25	5.69	
1985-06-17	5.49	
1985-05-22	5.66	
1985-04-24	5.49	
1985-04-01	5.31	
1985-02-27	5.24	
1985-01-23	4.90	
1984-12-18	5.20	
1984-11-27	4.94	
1984-10-22	5.27	
1984-09-25	5.06	

Date	Feet below Surface	Feet to Sealevel
1987-06-12	6.13	
1987-04-15	6.16	
1987-01-18	5.75	
1986-12-29	6.20	
1986-12-22	6.12	
1986-12-01	6.17	
1986-11-12	6.17	
1986-11-04	6.16	
1986-10-28	6.07	
1986-10-21	6.14	
1986-10-15	6.10	
1986-10-08	6.06	
1986-10-01	5.95	
1986-09-28	5.96	
1986-09-16	6.04	
1986-09-09	5.99	
1986-09-04	5.99	
1986-08-28	6.00	
1986-08-20	5.93	
1986-08-13	5.95	
1986-08-06	6.06	
1986-07-30	6.03	
1986-07-23	6.01	
1986-07-15	6.00	
1986-07-08	6.04	
1986-07-01	6.17	
1986-06-18	6.03	
1986-06-11	6.04	
1986-06-02	6.09	
1986-05-20	6.05	
1986-04-15	6.05	
1986-04-08	6.00	
1986-03-11	6.00	
1986-02-10	5.80	
1986-01-11	6.00	
1985-12-09	5.90	
1985-12-03	5.87	
1985-09-27	5.81	
1985-08-15	5.61	
1985-07-25	5.69	
1985-06-17	5.49	
1985-05-22	5.66	
1985-04-24	5.49	
1985-04-01	5.31	
1985-02-27	5.24	
1985-01-23	4.90	
1984-12-18	5.20	
1984-11-27	4.94	
1984-10-22	5.27	
1984-09-25	5.06	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1984-08-22	4.61	
1984-07-16	4.45	
1984-06-19	5.38	
1984-05-21	5.30	
1984-04-17	5.52	
1984-03-22	5.41	
1984-02-14	5.48	
1984-01-24	5.40	
1983-12-08	5.43	
1983-11-10	5.46	
1983-10-04	5.22	
1983-09-13	5.29	
1983-08-12	4.98	
1983-07-13	5.45	
1982-09-08	5.53	
1982-08-10	5.37	
1982-07-02	5.64	
1982-06-04	5.40	
1982-05-06	5.58	
1982-04-08	5.41	
1982-03-15	5.40	
1982-02-24	5.34	
1982-01-06	5.70	
1981-12-01	5.56	
1981-11-05	5.64	
1981-10-06	5.57	
1981-09-16	5.63	
1981-08-07	5.52	
1981-07-08	5.61	
1981-06-12	5.56	
1981-05-04	5.50	
1981-04-08	5.40	
1981-03-10	5.03	
1981-02-04	5.58	
1981-01-05	5.59	
1980-12-11	5.70	
1980-05-06	8	

Date	Feet below Surface	Feet to Sealevel
1984-08-22	4.61	
1984-07-16	4.45	
1984-06-19	5.38	
1984-05-21	5.30	
1984-04-17	5.52	
1984-03-22	5.41	
1984-02-14	5.48	
1984-01-24	5.40	
1983-12-08	5.43	
1983-11-10	5.46	
1983-10-04	5.22	
1983-09-13	5.29	
1983-08-12	4.98	
1983-07-13	5.45	
1982-09-08	5.53	
1982-08-10	5.37	
1982-07-02	5.64	
1982-06-04	5.40	
1982-05-06	5.58	
1982-04-08	5.41	
1982-03-15	5.40	
1982-02-24	5.34	
1982-01-06	5.70	
1981-12-01	5.56	
1981-11-05	5.64	
1981-10-06	5.57	
1981-09-16	5.63	
1981-08-07	5.52	
1981-07-08	5.61	
1981-06-12	5.56	
1981-05-04	5.50	
1981-04-08	5.40	
1981-03-10	5.03	
1981-02-04	5.58	
1981-01-05	5.59	
1980-12-11	5.70	
1980-05-06	8	

AO321
SSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003114**

Well log:	99033	App:	Not Reported
Notice of :	57838	Waiver no:	Not Reported
Date log r:	04/04/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	CA

Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-13-501-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/08/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	140
Depth dril:	160	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	160
Csng diame:	2		
Csng reduc:	0	Top perf:	140
Bottom per:	160	Perf inter:	1
Static wl:	80		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORP		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	2311	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2006
Update use:	Not Reported	Date updat:	05/18/2004
Edit statu:	F	Well start:	03/08/2006
Gravel p 1:	140	Gravel p 2:	160
Utm x:	679795.787973		
Utm y:	3989225.70578		
Site id:	NV4000000003114		

AO322
SSW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003115**

Well log:	99034	App:	Not Reported
Notice of :	57838	Waiver no:	Not Reported
Date log r:	04/04/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	13	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX LLC		
Owner addr:	8000 W LAKE MEAD		
Owner no:	Not Reported		
Parcel no:	178-13-501-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/07/2006	Date cmplt:	D
Gravel pac:	Y	Depth seal:	75
Depth dril:	107	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	105
Csng diame:	2		
Csng reduc:	0	Top perf:	75
Bottom per:	105	Perf inter:	1
Static wl:	80		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORP		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	2311	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2006
Update use:	Not Reported	Date updat:	05/18/2004
Edit statu:	F	Well start:	03/07/2006
Gravel p 1:	75	Gravel p 2:	105
Utm x:	679795.787973		
Utm y:	3989225.70578		
Site id:	NV4000000003115		

323
NNW
1/2 - 1 Mile
Lower

FED USGS **USGS3100137**

Agency cd:	USGS	Site no:	360322115001901
Site name:	212 S22 E62 01CDCC1 USBR PG102		
Latitude:	360322	EDR Site id:	USGS3100137
Longitude:	1150019	Dec lat:	36.05608691
Dec lon:	-115.00610491	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSESWS01 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1697.7		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19860904	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	32.	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count: 0
Water quality data end date: 1987-01-16
Ground water data begin date: 1980-12-11
Ground water data count: 54
Water quality data begin date: 1987-01-16
Water quality data count: 1
Ground water data end date: 1987-01-12

Ground-water levels, Number of Measurements: 54

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-01-12	27.54		1986-09-23	27.32	
1986-09-04	27.20		1986-04-09	26.82	
1986-03-11	26.67		1986-02-10	26.57	
1986-01-11	26.46		1985-12-10	26.32	
1985-09-23	26.14		1985-08-09	25.65	
1985-07-22	25.59		1985-06-17	25.21	
1985-05-21	25.06		1985-04-26	24.81	
1985-03-29	24.42		1985-02-19	23.82	
1985-01-30	24.12		1984-09-25	24.37	
1984-08-22	25.61		1984-07-18	26.61	
1984-06-19	26.57		1984-05-22	26.25	
1984-04-17	26.31		1984-03-20	26.15	
1984-03-01	26.15		1984-01-24	26.29	
1983-12-08	26.64		1983-11-10	26.58	
1983-10-04	26.50		1983-09-13	26.47	
1983-08-12	27.36		1983-07-13	26.95	
1982-09-09	26.68		1982-08-10	26.66	
1982-07-01	25.56		1982-06-04	26.42	
1982-05-06	26.45		1982-04-08	26.41	
1982-03-15	26.38		1982-02-24	26.39	
1982-01-06	26.33		1981-12-01	26.38	
1981-11-05	26.33		1981-10-06	26.06	
1981-09-16	26.21		1981-08-07	26.02	
1981-07-08	25.83		1981-06-12	25.63	
1981-05-04	25.35		1981-04-08	25.25	
1981-03-10	25.18		1981-02-04	24.96	
1981-01-05	24.71		1980-12-11	24.74	

AM324
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004612**

Well log:	95841	App:	Not Reported
Notice of :	24577	Waiver no:	Not Reported
Date log r:	04/05/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	02		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/08/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2005
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	01/05/2005
Gravel p 1:	28	Gravel p 2:	50
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004612		

AM325
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004613**

Well log:	95842	App:	Not Reported
Notice of :	24577	Waiver no:	Not Reported
Date log r:	04/05/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	03		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/08/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2005
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	01/05/2005
Gravel p 1:	28	Gravel p 2:	50
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004613		

AM326
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004614**

Well log:	98435	App:	Not Reported
Notice of :	28823	Waiver no:	R-1303
Date log r:	01/04/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	PIONEER AMERICAS INC		
Owner addr:	GIBSON & BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/20/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	27
Depth dril:	46	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	46
Csng diame:	6		
Csng reduc:	0	Top perf:	31
Bottom per:	46	Perf inter:	1
Static wl:	26		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	W D C EXPLORATION & WELLS		
Contract 2:	500 MAIN ST WOODLAND CA 95695		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/27/2006
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	10/17/2005
Gravel p 1:	27	Gravel p 2:	46

Utm x:	679345.503901
Utm y:	3991651.87842
Site id:	NV4000000004614

AM327
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004611**

Well log:	95840	App:	Not Reported
Notice of :	24577	Waiver no:	Not Reported
Date log r:	04/05/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	01		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/08/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2005
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	01/05/2005
Gravel p 1:	28	Gravel p 2:	50
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004611		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AM328 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004608**

Well log:	77676	App:	Not Reported
Notice of :	19919	Waiver no:	Not Reported
Date log r:	12/21/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	A
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	KERR-MCGEE CHEMICAL CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	TR-11		
Parcel no:	178-12-201-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/12/1999	Date cmplt:	D
Gravel pac:	Y	Depth seal:	200
Depth dril:	255	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	230
Csng diame:	4.5		
Csng reduc:	0	Top perf:	210
Bottom per:	230	Perf inter:	1
Static wl:	3.9		
Temperatur:	0		
Yield:	7		
Drawdown:	0		
Hours pump:	1		
Test metho:	B	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	7055A		
Contract 1:	BEYLIK DRILLING INC		
Contract 2:	3000 W MACARTHUR BLVD STE 660 SANTA ANA CA 92704		
Contract 3:	0		
Driller li:	2011	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/22/1999
Update use:	DSDAVIS	Date updat:	01/07/2000
Edit statu:	F	Well start:	10/09/1999
Gravel p 1:	200	Gravel p 2:	255
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004608		

	Database	EDR ID Number
AM329 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004609**

Well log:	95835	App:	Not Reported
Notice of :	24578	Waiver no:	Not Reported
Date log r:	04/05/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	01		
Parcel no:	178-12-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/16/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2005
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	01/13/2005
Gravel p 1:	28	Gravel p 2:	50
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004609		

AM330
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004610**

Well log:	95836	App:	Not Reported
Notice of :	24578	Waiver no:	Not Reported
Date log r:	04/05/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB

Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	MONTROSE CHEMICAL CORP		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	02		
Parcel no:	178-12-101-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/16/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	30
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	04/11/2005
Update use:	Not Reported	Date updat:	01/07/2000
Edit statu:	F	Well start:	01/13/2005
Gravel p 1:	28	Gravel p 2:	50
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004610		

AM331
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004619**

Well log:	108489	App:	Not Reported
Notice of :	60943	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	S
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX L L C		
Owner addr:	S OF WARM SPRINGS RD & E OF EASTGATE RD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/14/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	18
Depth dril:	55	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	49
Csng diame:	4.5		
Csng reduc:	0	Top perf:	26
Bottom per:	46	Perf inter:	1
Static wl:	29		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=ROTOSONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	Not Reported	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/08/2009
Gravel p 1:	23	Gravel p 2:	48
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004619		

AM332
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004620**

Well log:	108490	App:	Not Reported
Notice of :	60942	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX L L C		
Owner addr:	S OF WARM SPRINGS RD & E OF EASTGATE RD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/14/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	26
Depth dril:	60	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	57
Csng diame:	6.625		
Csng reduc:	0	Top perf:	34
Bottom per:	54	Perf inter:	1
Static wl:	32.5		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=ROTOSONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	Not Reported	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/12/2009
Gravel p 1:	31	Gravel p 2:	56
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004620		

AM333
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004621**

Well log:	108491	App:	Not Reported
Notice of :	60941	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX L L C		
Owner addr:	S OF WARM SPRINGS RD & E OF EASTGATE RD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/15/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	67
Depth dril:	150	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	86
Csng diame:	2.375		
Csng reduc:	0	Top perf:	73
Bottom per:	83	Perf inter:	1
Static wl:	27		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=ROTOSONIC		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	Not Reported	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/13/2009
Gravel p 1:	70	Gravel p 2:	84
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004621		

AM334
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004618**

Well log:	108487	App:	Not Reported
Notice of :	61794	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX L L C		
Owner addr:	E OF EASTGATE RD & S OF WARM SPRINGS RD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/14/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	19
Depth dril:	52	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	52
Csng diame:	2.375		
Csng reduc:	0	Top perf:	29
Bottom per:	49	Perf inter:	1
Static wl:	33		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	DBRANTLEY	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/05/2009
Gravel p 1:	24	Gravel p 2:	50
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004618		

AM335
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004615**

Well log:	107406	App:	Not Reported
Notice of :	60284	Waiver no:	Not Reported
Date log r:	10/09/2008	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	CITY OF HENDERSON		
Owner addr:	HENDERSON ROW S SITE WARM SPRINGS RD		
Owner no:	Not Reported		
Parcel no:	178-12-199-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/21/2008	Date cmplt:	D
Gravel pac:	Y	Depth seal:	18
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	44
Csng diame:	4		
Csng reduc:	0	Top perf:	21
Bottom per:	41	Perf inter:	1
Static wl:	23		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	21976		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 WEST 1700 SOUTH SALT LAKE CITY UT 84104		
Contract 3:	0		
Driller li:	2234	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/21/2009
Update use:	DBRANTLEY	Date updat:	02/05/2009
Edit statu:	F	Well start:	09/20/2008
Gravel p 1:	18	Gravel p 2:	42
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004615		

AM336
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004616**

Well log:	108485	App:	Not Reported
Notice of :	61792	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX L L C		
Owner addr:	E OF EASTGATE RD & S OF WARM SPRINGS RD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/14/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	16
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.375		
Csng reduc:	0	Top perf:	26
Bottom per:	46	Perf inter:	1
Static wl:	32		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	DBRANTLEY	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/04/2009
Gravel p 1:	21	Gravel p 2:	48
Utm x:	679345.503901		
Utm y:	3991651.87842		
Site id:	NV4000000004616		

AM337
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004617**

Well log:	108486	App:	Not Reported
Notice of :	61793	Waiver no:	Not Reported
Date log r:	07/13/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	12	Sec quarte:	BB
Legal quar:	NW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TRONOX L L C		
Owner addr:	E OF EASTGATE RD & S OF WARM SPRINGS RD		
Owner no:	Not Reported		
Parcel no:	178-12-101-003	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/14/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	11
Depth dril:	45	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	44
Csng diame:	2.375		
Csng reduc:	0	Top perf:	21
Bottom per:	41	Perf inter:	1
Static wl:	34		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	10157		
Contract 1:	BOART LONGYEAR		
Contract 2:	2640 W 1700 S SALT LAKE CITY UT 84104-4240		
Contract 3:	0		
Driller li:	2147	Source age:	NV003
User id:	DBRANTLEY	Date entry:	09/16/2009
Update use:	DBRANTLEY	Date updat:	09/16/2009
Edit statu:	F	Well start:	05/05/2009
Gravel p 1:	16	Gravel p 2:	43

Utm x:	679345.503901
Utm y:	3991651.87842
Site id:	NV4000000004617

AP338
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004378**

Well log:	96694	App:	Not Reported
Notice of :	27828	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-06		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/19/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/18/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004378		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AP339
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004379**

Well log:	96697	App:	Not Reported
Notice of :	27824	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-03		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/15/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/14/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004379		

AP340
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004377**

Well log:	96693	App:	Not Reported
Notice of :	27829	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-07		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/22/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/21/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004377		

AP341
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004375**

Well log:	96688	App:	Not Reported
Notice of :	27834	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD

Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-12		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/02/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	03/01/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004375		

AP342
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004376**

Well log:	96689	App:	Not Reported
Notice of :	27833	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-11		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/01/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/28/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004376		

AP343
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004380**

Well log:	96698	App:	Not Reported
Notice of :	27823	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-02		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/12/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/11/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004380		

AP344
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004384**

Well log:	96704	App:	Not Reported
Notice of :	27120	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-16		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/04/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/03/2005
Gravel p 1:	35	Gravel p 2:	60

Utm x:	678953.307432
Utm y:	3991243.10221
Site id:	NV4000000004384

AP345
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004385**

Well log:	96705	App:	Not Reported
Notice of :	27119	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	BC
Legal quar:	SW NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-15		
Parcel no:	178-12-301-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/03/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	DBRANTLEY	Date updat:	09/28/2005
Edit statu:	F	Well start:	02/02/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004385		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AP346 **WNW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004383**

Well log:	96703	App:	Not Reported
Notice of :	27121	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-17		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/05/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/05/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004383		

AP347 **WNW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004381**

Well log:	96699	App:	Not Reported
Notice of :	27822	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD
Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-01		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/11/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/10/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004381		

AP348
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004382**

Well log:	96702	App:	Not Reported
Notice of :	27122	Waiver no:	Not Reported
Date log r:	06/01/2005	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AD

Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC REMEDIATION CO		
Owner addr:	875 W WARM SPRINGS RD		
Owner no:	BS-18		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/08/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	06/17/2005
Update use:	Not Reported	Date updat:	11/02/1998
Edit statu:	F	Well start:	02/07/2005
Gravel p 1:	35	Gravel p 2:	60
Utm x:	678953.307432		
Utm y:	3991243.10221		
Site id:	NV4000000004382		

AQ349
NNE
1/2 - 1 Mile
Lower

FED USGS **USGS3088677**

Agency cd:	USGS	Site no:	360319114593402
Site name:	212 S22 E63 07BBBB1 USBR PG207		
Latitude:	360319	EDR Site id:	USGS3088677
Longitude:	1145934	Dec lat:	36.0552538
Dec lon:	-114.99360449	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNWNWS07 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1706.08		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19820327
Date inventoried:	19860612	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	20.	Hole depth:	46.
Source of depth data:	driller		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1987-01-18
Water quality data end date:	1987-01-18	Water quality data count:	1
Ground water data begin date:	1982-03-27	Ground water data end date:	1987-06-17
Ground water data count:	119		

Ground-water levels, Number of Measurements: 119

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-17	13.50		1987-05-17	14.01	
1987-04-15	13.45		1987-03-20	10.95	
1987-02-26					
Note: The site was dry (no water level recorded).					
1987-01-18	13.44		1987-01-05	12.93	
1986-12-29	13.54		1986-12-22	13.33	
1986-12-18	13.02		1986-12-08	13.43	
1986-12-01	13.34		1986-11-24	13.23	
1986-11-21	13.12		1986-11-12	13.05	
1986-11-04	12.92		1986-10-28	12.78	
1986-10-21	12.62		1986-10-15	12.48	
1986-10-07	12.30		1986-10-01	12.10	
1986-09-27	11.99		1986-09-16	11.42	
1986-09-09	10.74		1986-09-03	9.06	
1986-08-28	10.57		1986-08-20	11.88	
1986-08-13	11.73		1986-08-06	11.44	
1986-07-30	11.10		1986-07-23	10.82	
1986-07-15	10.44		1986-07-08	9.88	
1986-06-28	9.32		1986-06-18	8.11	
1986-06-11	6.73		1986-06-03	6.88	
1986-05-13	6.87		1986-04-24	8.00	
1986-04-17	8.00		1986-04-14	7.41	
1986-04-10	7.80		1986-04-03	8.20	
1986-03-27	8.70		1986-03-22	8.20	
1986-03-06	10.10		1986-02-27	10.10	
1986-02-22	10.20		1986-02-15	10.60	
1986-02-06	10.00		1986-01-30	9.00	
1986-01-23	8.80		1986-01-16	10.00	
1986-01-10	10.80		1985-12-26	11.00	
1985-12-12	12.00		1985-12-05	11.80	
1985-11-26	11.67		1985-11-21	11.59	
1985-11-14	11.21		1985-11-07	11.39	
1985-10-31	11.25		1985-10-24	11.11	
1985-10-17	10.93		1985-10-10	10.77	
1985-10-03	10.62		1985-09-26	10.44	
1985-09-19	10.24		1985-09-12	10.08	
1985-09-05	9.83		1985-08-29	9.59	
1985-08-22	9.30		1985-08-15	8.96	
1985-08-09	8.73		1985-08-01	8.04	
1985-07-25	7.96		1985-07-22	8.24	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1985-07-17	7.81		1985-07-15	7.74	
1985-07-11	7.49		1985-07-10	7.37	
1985-07-09	7.37		1985-07-08	7.29	
1985-07-07	7.21		1985-07-06	7.15	
1985-07-05	7.05		1985-07-03	6.77	
1985-07-02	6.83		1985-07-01	6.95	
1985-06-30	6.87		1985-06-29	6.80	
1985-06-28	6.68		1985-06-27	6.60	
1985-06-26	6.54		1985-06-25	6.40	
1985-06-24	6.44		1985-06-23	6.44	
1985-06-22	6.31		1985-06-21	6.26	
1985-06-17	6.19		1985-06-11	6.14	
1985-05-21	6.17		1985-04-24	6.10	
1985-03-29	5.92		1985-02-19	5.88	
1985-01-28	5.80		1984-12-17	6.00	
1984-11-27	5.96		1984-10-19	6.09	
1984-09-25	5.53		1984-08-22	5.82	
1984-07-16	4.50		1984-06-21	5.55	
1984-05-21	5.52		1984-04-17	6.55	
1984-03-20	5.68		1984-02-14	5.72	
1984-01-26	5.75		1982-03-27	6	

AQ350
NNE
1/2 - 1 Mile
Lower

FED USGS **USGS3088676**

Agency cd:	USGS	Site no:	360319114593401
Site name:	212 S22 E63 07BBBA1 USBR PG206		
Latitude:	360319	EDR Site id:	USGS3088676
Longitude:	1145934	Dec lat:	36.0552538
Dec lon:	-114.99360449	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	NWNWNWS07 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1707.71		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19830218
Date inventoried:	19860612	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	36.	Hole depth:	38.
Source of depth data:	driller		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count: 0
Water quality data end date: 0000-00-00
Ground water data begin date: 1983-02-18
Ground water data count: 75

Water quality data begin date: 0000-00-00
Water quality data count: 0
Ground water data end date: 1987-01-16

Ground-water levels, Number of Measurements: 75

Date	Feet below Surface	Feet to Sealevel
1987-01-16		
Note: The site was dry (no water level recorded).		
1986-12-22		
Note: The site was dry (no water level recorded).		
1986-11-21		
Note: The site was dry (no water level recorded).		
1986-10-15		
Note: The site was dry (no water level recorded).		
1986-09-03		
Note: The site was dry (no water level recorded).		
1986-07-18		
Note: The site was dry (no water level recorded).		
1986-07-08		
Note: The site was dry (no water level recorded).		
1986-06-28		
Note: The site was dry (no water level recorded).		
1986-06-18	9.20	
1986-06-02	8.33	
1986-04-14	9.40	
1986-01-10	12.00	
1985-12-12	13.10	
1985-11-26	12.80	
1985-11-14	12.50	
1985-10-31	12.40	
1985-10-17	12.00	
1985-10-04	11.80	
1985-09-19	11.40	
1985-09-05	11.00	
1985-08-22	10.40	
1985-08-15	10.17	
1985-08-01	9.34	
1985-07-18	9.04	
1985-07-11	8.65	
1985-07-09	8.52	
1985-07-07	8.40	
1985-07-05	8.19	
1985-07-02	7.95	
1985-06-30	7.98	
1985-06-28	7.79	
1985-06-26	7.65	
1985-06-24	7.48	
1985-06-22	7.34	
1985-06-11	7.15	
1984-12-17	7.05	
1984-10-19	7.03	
1984-08-22	6.54	
1984-06-20	6.67	
1984-04-17	6.82	
1984-02-14	6.74	
1983-02-18	7	

Date	Feet below Surface	Feet to Sealevel
1986-06-09	8.30	
1986-05-13	8.62	
1986-01-16	11.40	
1985-12-27	12.50	
1985-12-05	13.00	
1985-11-21	12.70	
1985-11-07	12.50	
1985-10-24	12.20	
1985-10-10	11.90	
1985-09-26	11.60	
1985-09-12	11.20	
1985-08-29	10.70	
1985-08-16	10.20	
1985-08-08	9.82	
1985-07-25	9.20	
1985-07-15	8.87	
1985-07-10	8.62	
1985-07-08	8.46	
1985-07-06	8.26	
1985-07-03	7.99	
1985-07-01	8.03	
1985-06-29	7.91	
1985-06-27	7.69	
1985-06-25	7.46	
1985-06-23	7.47	
1985-06-21	7.24	
1985-01-28	6.88	
1984-11-27	6.99	
1984-09-24	6.83	
1984-07-16	6.19	
1984-05-22	6.56	
1984-03-20	6.74	
1984-01-25	6.77	

Map ID Direction Distance Elevation			Database	EDR ID Number
351 **ENE** **1/2 - 1 Mile** **Lower**			**NV WELLS**	**NV4000000004279**

Well log:	45787	App:	Not Reported
Notice of :	12593	Waiver no:	MO-2447
Date log r:	09/15/1994	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	07	Sec quarte:	CA
Legal quar:	NE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BROADBENT & ASSOCIATES		
Owner addr:	BOULDER HWY & WATER ST		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/20/1994	Date cmplt:	D
Gravel pac:	N	Depth seal:	0
Depth dril:	74	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	65		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	35639		
Contract 1:	B L WEBER GROUP INC (THE)		
Contract 2:	16825 S WEBER DR CHANDLER AZ 85226-4112		
Contract 3:	0		
Driller li:	1910	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/21/1994
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	05/20/1994
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681384.519875		
Utm y:	3991108.10137		
Site id:	NV4000000004279		

AN352 **North** **1/2 - 1 Mile** **Lower**		**FED USGS**	**USGS3088683**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Agency cd:	USGS	Site no:	360326115000201
Site name:	212 S22 E62 01DDCC1 USBR PG238		
Latitude:	360326	EDR Site id:	USGS3088683
Longitude:	1150002	Dec lat:	36.05719808
Dec lon:	-115.00138263	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSESES01 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1686.06		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.1		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19830222
Date inventoried:	19860613	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	22.	Hole depth:	23.
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1987-01-12
Water quality data end date:	1987-01-12	Water quality data count:	1
Ground water data begin date:	1983-02-22	Ground water data end date:	1987-06-18
Ground water data count:	44		

Ground-water levels, Number of Measurements: 88

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1987-06-18	7.54		1987-06-18	7.54	
1987-05-17	7.40		1987-05-17	7.40	
1987-04-15	7.44		1987-04-15	7.44	
1987-03-25	7.38		1987-03-25	7.38	
1987-02-26	7.33		1987-02-26	7.33	
1987-01-12	7.12		1987-01-12	7.12	
1986-12-22	7.42		1986-12-22	7.42	
1986-11-19	7.32		1986-11-19	7.32	
1986-10-23	7.54		1986-10-23	7.54	
1986-09-28	7.43		1986-09-28	7.43	
1986-08-11	7.49		1986-08-11	7.49	
1986-07-15	7.44		1986-07-15	7.44	
1986-06-17	7.41		1986-06-17	7.41	
1986-05-20	7.46		1986-05-20	7.46	
1986-04-15	7.45		1986-04-15	7.45	
1986-04-08	7.40		1986-04-08	7.40	
1986-03-11	7.40		1986-03-11	7.40	
1986-02-10	7.50		1986-02-10	7.50	
1986-01-11	7.50		1986-01-11	7.50	
1985-12-09	7.40		1985-12-09	7.40	
1985-11-19	7.78		1985-11-19	7.78	
1985-10-19	7.36		1985-10-19	7.36	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1985-09-23	7.49	
1985-08-08	7.36	
1985-07-22	7.45	
1985-06-17	7.27	
1985-05-22	7.29	
1985-04-24	7.21	
1985-04-01	7.26	
1985-02-19	7.12	
1985-01-23	6.93	
1984-12-17	7.08	
1984-11-27	7.06	
1984-10-19	7.18	
1984-09-25	7.14	
1984-08-22	6.97	
1984-07-16	7.17	
1984-06-19	7.13	
1984-05-21	7.16	
1984-04-16	7.27	
1984-03-20	7.10	
1984-02-14	7.32	
1984-01-26	7.20	
1983-02-22	6	

Date	Feet below Surface	Feet to Sealevel
1985-09-23	7.49	
1985-08-08	7.36	
1985-07-22	7.45	
1985-06-17	7.27	
1985-05-22	7.29	
1985-04-24	7.21	
1985-04-01	7.26	
1985-02-19	7.12	
1985-01-23	6.93	
1984-12-17	7.08	
1984-11-27	7.06	
1984-10-19	7.18	
1984-09-25	7.14	
1984-08-22	6.97	
1984-07-16	7.17	
1984-06-19	7.13	
1984-05-21	7.16	
1984-04-16	7.27	
1984-03-20	7.10	
1984-02-14	7.32	
1984-01-26	7.20	
1983-02-22	6	

AR353
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003546**

Well log:	85680	App:	Not Reported
Notice of :	22676	Waiver no:	Not Reported
Date log r:	03/11/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	EQUIVA SERVICES		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	179-18-204-015	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2002
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/23/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003546		

AR354
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003547**

Well log:	85681	App:	Not Reported
Notice of :	22676	Waiver no:	Not Reported
Date log r:	03/11/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	EQUIVA SERVICES		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	179-18-204-015	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2002
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/23/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003547		

AR355
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003548**

Well log:	85682	App:	Not Reported
Notice of :	22676	Waiver no:	Not Reported
Date log r:	03/11/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	EQUIVA SERVICES		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	179-18-204-015	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2002
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/23/2002
Gravel p 1:	0	Gravel p 2:	0

Utm x:	681385.627944
Utm y:	3989844.17004
Site id:	NV4000000003548

AR356
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003545**

Well log:	66797	App:	Not Reported
Notice of :	10579	Waiver no:	MO-2172
Date log r:	08/13/1992	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TEXACO		
Owner addr:	LAKE MEAD DR & WATER ST		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/08/1992	Date cmplt:	D
Gravel pac:	Y	Depth seal:	62
Depth dril:	95	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	95
Csng diame:	4		
Csng reduc:	0	Top perf:	65
Bottom per:	95	Perf inter:	1
Static wl:	77		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1817	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/24/1997
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	07/08/1992
Gravel p 1:	62	Gravel p 2:	95
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003545		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AR357
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003542**

Well log:	51127	App:	Not Reported
Notice of :	16289	Waiver no:	MO-2642
Date log r:	12/13/1995	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	BROADBENT & ASSOCIATES		
Owner addr:	E LAKE MEAD DR HENDERSON NV		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/18/1995	Date cmplt:	D
Gravel pac:	Y	Depth seal:	55
Depth dril:	95	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	95
Csng diame:	4.5		
Csng reduc:	0	Top perf:	65
Bottom per:	95	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	THOMAS HIGH		
Contract 2:	731 PILOT RD STE H LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	05/13/1996
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	10/17/1995
Gravel p 1:	55	Gravel p 2:	95
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003542		

AR358
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003543**

Well log:	66791	App:	Not Reported
Notice of :	13762	Waiver no:	MO-2393A
Date log r:	12/16/1994	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	HANILY, JIM		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	MW-01		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/18/1994	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	92	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	92
Csng diame:	2.37		
Csng reduc:	0	Top perf:	22
Bottom per:	92	Perf inter:	1
Static wl:	82		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/24/1997
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	11/18/1994
Gravel p 1:	20	Gravel p 2:	92
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003543		

AR359
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003544**

Well log:	66792	App:	Not Reported
Notice of :	10578	Waiver no:	MO-2172
Date log r:	08/13/1992	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD

Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	T		
Owner curr:	TEXACO		
Owner addr:	LAKE MEAD DR & WATER ST		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	07/15/1992	Date cmplt:	D
Gravel pac:	Y	Depth seal:	62
Depth dril:	95	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	95
Csng diame:	4		
Csng reduc:	0	Top perf:	65
Bottom per:	95	Perf inter:	1
Static wl:	68		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1817	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/24/1997
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	07/15/1992
Gravel p 1:	62	Gravel p 2:	95
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003544		

AR360
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003549**

Well log:	85683	App:	Not Reported
Notice of :	22676	Waiver no:	Not Reported
Date log r:	03/11/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	EQUIVA SERVICES		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	179-18-204-015	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2002
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/23/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003549		

AR361
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003554**

Well log:	98872	App:	Not Reported
Notice of :	28682	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/13/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	44
Depth dril:	87	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	87
Csng diame:	4		
Csng reduc:	0	Top perf:	47
Bottom per:	87	Perf inter:	1
Static wl:	71.61		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/30/2006
Update use:	Not Reported	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/13/2005
Gravel p 1:	44	Gravel p 2:	87
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003554		

AR362
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003555**

Well log:	103353	App:	Not Reported
Notice of :	30960	Waiver no:	Not Reported
Date log r:	05/31/2007	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	LAKE MEAD CROSSING LLC		
Owner addr:	110 W LAKE MEAD PKWY		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/24/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	92	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	92
Csng diame:	2		
Csng reduc:	0	Top perf:	42
Bottom per:	92	Perf inter:	1
Static wl:	69.1		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	4255 W POST RD LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1944	Source age:	NV003
User id:	SGARDELLA	Date entry:	09/11/2007
Update use:	Not Reported	Date updat:	05/09/2006
Edit statu:	F	Well start:	05/24/2007
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003555		

AR363
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003556**

Well log:	104363	App:	Not Reported
Notice of :	30956	Waiver no:	Not Reported
Date log r:	05/31/2007	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	LAKE MEAD CROSSING LLC		
Owner addr:	LAKE MEAD & WATER ST		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/24/2007	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	97	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	97
Csng diame:	2		
Csng reduc:	0	Top perf:	67
Bottom per:	97	Perf inter:	1
Static wl:	72		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	54931		
Contract 1:	ELITE DRILLING INC		
Contract 2:	4255 W POST RD LAS VEGAS NV 89118		
Contract 3:	0		
Driller li:	1944	Source age:	NV003
User id:	SGARDELLA	Date entry:	01/08/2008
Update use:	Not Reported	Date updat:	05/09/2006
Edit statu:	F	Well start:	05/24/2007
Gravel p 1:	0	Gravel p 2:	0

Utm x:	681385.627944
Utm y:	3989844.17004
Site id:	NV4000000003556

AR364
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003553**

Well log:	98848	App:	Not Reported
Notice of :	28681	Waiver no:	Not Reported
Date log r:	03/21/2006	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	Z
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	TITANIUM METALS CORPORATION		
Owner addr:	8000 W LAKE MEAD BLVD		
Owner no:	Not Reported		
Parcel no:	179-18-101-005	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/12/2005	Date cmplt:	D
Gravel pac:	Y	Depth seal:	55
Depth dril:	87	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	87
Csng diame:	4		
Csng reduc:	0	Top perf:	57
Bottom per:	87	Perf inter:	1
Static wl:	73.57		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks:	DRILLING METHOD=SONIC		
Remarks ad:	Not Reported		
Contractor:	15765		
Contract 1:	PROSONIC CORPORATION		
Contract 2:	419 E JUANITA AVE MESA AZ 85204		
Contract 3:	0		
Driller li:	1988	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2006
Update use:	DBRANTLEY	Date updat:	05/09/2006
Edit statu:	F	Well start:	12/11/2005
Gravel p 1:	55	Gravel p 2:	87

Utm x:	681385.627944
Utm y:	3989844.17004
Site id:	NV4000000003553

AR365
ESE
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003550**

Well log:	85684	App:	Not Reported
Notice of :	22676	Waiver no:	Not Reported
Date log r:	03/11/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	EQUIVA SERVICES		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	179-18-204-015	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2002
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/23/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003550		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AR366 **ESE** **1/2 - 1 Mile** **Higher**	**NV WELLS**	**NV4000000003551**

Well log:	85685	App:	Not Reported
Notice of :	22676	Waiver no:	Not Reported
Date log r:	03/11/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	EQUIVA SERVICES		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	179-18-204-015	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2002
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/23/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003551		

AR367 **ESE** **1/2 - 1 Mile** **Higher**	**NV WELLS**	**NV4000000003552**

Well log:	85686	App:	Not Reported
Notice of :	22676	Waiver no:	Not Reported
Date log r:	03/11/2002	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E63	Legal rng:	63E
Sec:	18	Sec quarte:	BD
Legal quar:	SE NW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	EQUIVA SERVICES		
Owner addr:	65 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	179-18-204-015	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/23/2002	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	90	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	34699		
Contract 1:	SPECTRUM EXPLORATION INC		
Contract 2:	5015 SHOREHAM PL SAN DIEGO CA 92122		
Contract 3:	0		
Driller li:	2059	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/27/2002
Update use:	Not Reported	Date updat:	07/08/1997
Edit statu:	F	Well start:	02/23/2002
Gravel p 1:	0	Gravel p 2:	0
Utm x:	681385.627944		
Utm y:	3989844.17004		
Site id:	NV4000000003552		

368
SW
1/2 - 1 Mile
Higher

NV WELLS **NV4000000003387**

Well log:	73840	App:	Not Reported
Notice of :	17679	Waiver no:	Not Reported
Date log r:	02/16/1999	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	14	Sec quarte:	AD

Legal quar:	SE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	AMERICAN PACIFIC CORP		
Owner addr:	3770 HOWARD HUGHES PKWY #366		
Owner no:	Not Reported		
Parcel no:	178-14-601-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/11/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	42	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	42
Csng diame:	2		
Csng reduc:	0	Top perf:	22
Bottom per:	42	Perf inter:	1
Static wl:	25		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	2044	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/05/1999
Update use:	dsdavis	Date updat:	03/05/1999
Edit statu:	F	Well start:	02/10/1998
Gravel p 1:	20	Gravel p 2:	42
Utm x:	678986.641485		
Utm y:	3989609.91727		
Site id:	NV4000000003387		

AS369
NNW
1/2 - 1 Mile
Lower

FED USGS **USGS3088685**

Agency cd:	USGS	Site no:	360328115001501
Site name:	212 S22 E62 01CBA 1		
Latitude:	360328	EDR Site id:	USGS3088685
Longitude:	1150015	Dec lat:	36.05775356
Dec lon:	-115.00499384	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWNWNES01 T22S R62E M
Location map:	LAS VEGAS SE, NV	Map scale:	24000
Altitude:	1688.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	LVHD		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1946-03-17	Ground water data end date:	1952-02-20
Ground water data count:	39		

Ground-water levels, Number of Measurements: 78

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1952-02-20	10.02		1952-02-20	10.02	
1951-11-15	11.24		1951-11-15	11.24	
1951-08-23	12.33		1951-08-23	12.33	
1951-05-16	14.17		1951-05-16	14.17	
1951-02-21	15.35		1951-02-21	15.35	
1950-08-22	17.07		1950-08-22	17.07	
1950-05-30	17.95		1950-05-30	17.95	
1950-02-24	18.74		1950-02-24	18.74	
1949-11-30	19.64		1949-11-30	19.64	
1949-08-18	19.19		1949-08-18	19.19	
1949-05-18	19.57		1949-05-18	19.57	
1949-02-23	19.46		1949-02-23	19.46	
1948-11-17	19.84		1948-11-17	19.84	
1948-08-13	20.02		1948-08-13	20.02	
1948-05-26	19.95		1948-05-26	19.95	
1948-04-22	19.02		1948-04-22	19.02	
1948-03-24	19.78		1948-03-24	19.78	
1948-02-25	20.12		1948-02-25	20.12	
1948-01-22	20.42		1948-01-22	20.42	
1947-12-18	20.60		1947-12-18	20.60	
1947-11-28	20.78		1947-11-28	20.78	
1947-10-23	20.70		1947-10-23	20.70	
1947-09-10	20.35		1947-09-10	20.35	
1947-08-19	20.14		1947-08-19	20.14	
1947-07-23	19.87		1947-07-23	19.87	
1947-06-26	19.56		1947-06-26	19.56	
1947-05-27	19.21		1947-05-27	19.21	
1947-04-27	18.68		1947-04-27	18.68	
1947-02-26	17.94		1947-02-26	17.94	
1947-01-30	17.42		1947-01-30	17.42	
1946-12-20	17.16		1946-12-20	17.16	
1946-11-30	16.37		1946-11-30	16.37	
1946-10-30	16.53		1946-10-30	16.53	
1946-09-26	16.08		1946-09-26	16.08	
1946-08-27	15.58		1946-08-27	15.58	
1946-07-29	15.05		1946-07-29	15.05	
1946-06-25	14.45		1946-06-25	14.45	
1946-05-27	13.95		1946-05-27	13.95	
1946-03-17	13.87		1946-03-17	13.87	

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

370
NNE
1/2 - 1 Mile
Lower | **FED USGS** | **USGS3088681**

Agency cd:	USGS	Site no:	360324114593301
Site name:	212 S22 E63 06CCCC1 USBR PG242		
Latitude:	360324	EDR Site id:	USGS3088681
Longitude:	1145933	Dec lat:	36.05664266
Dec lon:	-114.99332676	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	32
State:	32	County:	003
Country:	US	Land net:	SWSWSWS06 T22S R63E M
Location map:	HENDERSON, NV	Map scale:	24000
Altitude:	1695.		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Las Vegas Wash. Nevada. Area = 1860 sq.mi.		
Topographic:	Alluvial fan		
Site type:	Ground-water other than Spring	Date construction:	19830222
Date inventoried:	19860613	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	38.	Hole depth:	41.
Source of depth data:	reporting agency (generally USGS)		
Project number:	473213700		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1983-02-22	Ground water data end date:	1986-12-22
Ground water data count:	58		

Ground-water levels, Number of Measurements: 58

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1986-12-22	18.96		1986-12-18	18.85	
1986-12-08	18.90		1986-12-01	18.81	
1986-11-24	18.73		1986-11-21	18.64	
1986-11-12	18.58		1986-11-04	18.47	
1986-10-28	18.36		1986-10-21	18.26	
1986-10-15	18.16		1986-10-08	18.04	
1986-10-01	17.91		1986-09-23	17.74	
1986-09-16	17.53		1986-09-09	17.02	
1986-09-04	16.29		1986-08-28	17.45	
1986-08-20	17.60		1986-08-13	17.41	
1986-08-07	17.11		1986-07-30	16.81	
1986-07-23	16.54		1986-07-16	16.22	
1986-07-09	15.27		1986-06-18	13.75	
1986-06-09	12.59		1986-06-03	12.95	
1986-05-27	12.27		1986-05-20	12.66	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1986-04-14	14.77	
1986-03-11	15.80	
1986-01-10	17.00	
1985-09-24	15.33	
1985-07-29	12.92	
1985-05-22	10.67	
1985-03-29	10.43	
1985-01-28	10.30	
1984-11-27	10.22	
1984-09-24	10.09	
1984-07-16	7.18	
1984-05-22	6.51	
1984-03-20	7.11	
1984-01-24	6.89	
1986-04-07	15.50	
1986-02-10	16.20	
1985-12-09	17.10	
1985-08-15	13.73	
1985-06-20	10.72	
1985-04-26	10.76	
1985-02-27	10.47	
1984-12-17	10.35	
1984-10-19	10.16	
1984-08-22	9.21	
1984-06-20	6.81	
1984-04-17	7.33	
1984-02-14	7.12	
1983-02-22	5	

AT371
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004786**

Well log:	89912	App:	Not Reported
Notice of :	25254	Waiver no:	Not Reported
Date log r:	07/17/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	06/30/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	2
Depth dril:	20	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	20
Csng diame:	4.25		
Csng reduc:	0	Top perf:	5
Bottom per:	20	Perf inter:	1
Static wl:	11		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7560 W SAHARA AVE STE 101 LAS VEGAS NV 89117		
Contract 3:	0		
Driller li:	2202	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/22/2003
Update use:	Not Reported	Date updat:	01/21/1998
Edit statu:	F	Well start:	06/30/2003
Gravel p 1:	3	Gravel p 2:	20
Utm x:	680163.042576		
Utm y:	3992069.40827		
Site id:	NV4000000004786		

AT372
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004787**

Well log:	94376	App:	Not Reported
Notice of :	27109	Waiver no:	Not Reported
Date log r:	11/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	01		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/29/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	0
Depth dril:	20	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	20
Csng diame:	4.25		
Csng reduc:	0	Top perf:	5
Bottom per:	20	Perf inter:	1
Static wl:	10		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2202	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/12/2004
Update use:	Not Reported	Date updat:	01/21/1998
Edit statu:	F	Well start:	10/28/2004
Gravel p 1:	3	Gravel p 2:	20

Utm x:	680163.042576
Utm y:	3992069.40827
Site id:	NV4000000004787

AT373
North
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004788**

Well log:	94377	App:	Not Reported
Notice of :	27109	Waiver no:	Not Reported
Date log r:	11/08/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	02		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	10/29/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	0
Depth dril:	20	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	20
Csng diame:	4.25		
Csng reduc:	0	Top perf:	5
Bottom per:	20	Perf inter:	1
Static wl:	10		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2202	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/12/2004
Update use:	Not Reported	Date updat:	01/21/1998
Edit statu:	F	Well start:	10/28/2004
Gravel p 1:	3	Gravel p 2:	20
Utm x:	680163.042576		
Utm y:	3992069.40827		
Site id:	NV4000000004788		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

374
West
1/2 - 1 Mile
Lower

NV WELLS **NV4000000003821**

Well log:	36997	App:	Not Reported
Notice of :	2755	Waiver no:	MO-2005
Date log r:	06/01/1989	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DC
Legal quar:	SW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	P O BOX 86 HENDERSON NV		
Owner no:	H-073		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/25/1989	Date cmplt:	D
Gravel pac:	Y	Depth seal:	39
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4		
Csng reduc:	0	Top perf:	44
Bottom per:	54	Perf inter:	1
Static wl:	48		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	DON WILSON		
Contract 2:	4055 S SPENCER STE 120 LV NV		
Contract 3:	0		
Driller li:	1589	Source age:	NV003
User id:	KLOHAIR	Date entry:	06/17/2005
Update use:	dsdavis	Date updat:	07/08/1997
Edit statu:	F	Well start:	01/25/1989
Gravel p 1:	39	Gravel p 2:	60
Utm x:	678594.259112		
Utm y:	3990434.26258		
Site id:	NV4000000003821		

AS375
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004781**

Well log:	66502	App:	Not Reported
Notice of :	13768	Waiver no:	Not Reported
Date log r:	12/30/1994	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	SOUTHLAND CORP		
Owner addr:	1453 N BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/15/1994	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/1997
Update use:	Not Reported	Date updat:	11/12/1997
Edit statu:	F	Well start:	12/15/1994
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.685651		
Utm y:	3992061.18704		
Site id:	NV4000000004781		

AS376
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004780**

Well log:	66501	App:	Not Reported
Notice of :	13768	Waiver no:	Not Reported
Date log r:	12/30/1994	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	CD

Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	SOUTHLAND CORP		
Owner addr:	1453 N BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/15/1994	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/1997
Update use:	Not Reported	Date updat:	11/12/1997
Edit statu:	F	Well start:	12/15/1994
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.685651		
Utm y:	3992061.18704		
Site id:	NV4000000004780		

AS377
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004779**

Well log:	66500	App:	Not Reported
Notice of :	13768	Waiver no:	Not Reported
Date log r:	12/30/1994	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	SOUTHLAND CORP		
Owner addr:	1453 N BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/15/1994	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/1997
Update use:	dsdavis	Date updat:	11/12/1997
Edit statu:	F	Well start:	12/15/1994
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.685651		
Utm y:	3992061.18704		
Site id:	NV4000000004779		

AS378
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004782**

Well log:	66503	App:	Not Reported
Notice of :	13768	Waiver no:	Not Reported
Date log r:	12/30/1994	Date log 1:	D
Site type:	E	Work type:	P
Work type :	Not Reported		
Proposed u:	G	Drilling m:	U
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	SOUTHLAND CORP		
Owner addr:	1453 N BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	12/15/1994	Date cmplt:	D
Gravel pac:	Not Reported	Depth seal:	0
Depth dril:	0	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	0
Csng diame:	0		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	1869	Source age:	NV003
User id:	DBRANTLEY	Date entry:	07/09/1997
Update use:	Not Reported	Date updat:	11/12/1997
Edit statu:	F	Well start:	12/15/1994
Gravel p 1:	0	Gravel p 2:	0
Utm x:	679762.685651		
Utm y:	3992061.18704		
Site id:	NV4000000004782		

AS379
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004785**

Well log:	94214	App:	Not Reported
Notice of :	26207	Waiver no:	Not Reported
Date log r:	08/12/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	SECOR		
Owner addr:	1453 N BOULDER HWY		
Owner no:	02		
Parcel no:	178-01-410-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/23/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	3
Depth dril:	20	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	20
Csng diame:	4		
Csng reduc:	0	Top perf:	5
Bottom per:	20	Perf inter:	1
Static wl:	8		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	01/21/1998
Edit statu:	F	Well start:	05/23/2004
Gravel p 1:	3	Gravel p 2:	20

Utm x:	679762.685651
Utm y:	3992061.18704
Site id:	NV4000000004785

AS380
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004784**

Well log:	94213	App:	Not Reported
Notice of :	26207	Waiver no:	Not Reported
Date log r:	08/12/2004	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	M		
Owner curr:	SECOR		
Owner addr:	1453 N BOULDER HWY		
Owner no:	01		
Parcel no:	178-01-410-007	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	05/23/2004	Date cmplt:	D
Gravel pac:	Y	Depth seal:	3
Depth dril:	20	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	20
Csng diame:	4		
Csng reduc:	0	Top perf:	5
Bottom per:	20	Perf inter:	1
Static wl:	8		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	11/01/2004
Update use:	Not Reported	Date updat:	01/21/1998
Edit statu:	F	Well start:	05/23/2004
Gravel p 1:	3	Gravel p 2:	20
Utm x:	679762.685651		
Utm y:	3992061.18704		
Site id:	NV4000000004784		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AS381
NNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004783**

Well log:	68387	App:	Not Reported
Notice of :	16866	Waiver no:	Not Reported
Date log r:	10/08/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	CD
Legal quar:	SE SW	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	MOOSE LODGE		
Owner addr:	1538 N BOULDER HWY HENDERSON		
Owner no:	Not Reported		
Parcel no:	178-01-411-002	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	09/12/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	4
Depth dril:	25	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	25
Csng diame:	2.375		
Csng reduc:	0	Top perf:	10
Bottom per:	24	Perf inter:	2
Static wl:	21.5		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	Not Reported		
Contract 1:	Not Reported		
Contract 2:	Not Reported		
Contract 3:	0		
Driller li:	0	Source age:	NV003
User id:	KCOON	Date entry:	10/29/1997
Update use:	user15	Date updat:	01/21/1998
Edit statu:	F	Well start:	09/12/1997
Gravel p 1:	7	Gravel p 2:	25
Utm x:	679762.685651		
Utm y:	3992061.18704		
Site id:	NV4000000004783		

382
WNW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004068**

Well log:	109289	App:	Not Reported
Notice of :	32211	Waiver no:	Not Reported
Date log r:	04/10/2009	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	DB
Legal quar:	NW SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	Not Reported
Lat long a:	M		
Owner curr:	BASIC ENVIRONMENTAL CO LLC		
Owner addr:	Not Reported		
Owner no:	Not Reported		
Parcel no:	178-11-501-006	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/29/2009	Date cmplt:	D
Gravel pac:	Y	Depth seal:	23
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	4		
Csng reduc:	0	Top perf:	25
Bottom per:	50	Perf inter:	1
Static wl:	39		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	51266		
Contract 1:	EAGLE DRILLING SERVICES LLC		
Contract 2:	7150 PLACID STREET LAS VEGAS NV 89119		
Contract 3:	0		
Driller li:	2357	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/09/2009
Update use:	Not Reported	Date updat:	02/16/2001
Edit statu:	F	Well start:	03/29/2009
Gravel p 1:	23	Gravel p 2:	50
Utm x:	678561.073952		
Utm y:	3990834.34519		
Site id:	NV4000000004068		

AU383
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004596**

Well log:	69538	App:	Not Reported
Notice of :	16522	Waiver no:	Not Reported
Date log r:	12/09/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA

Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/10/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.25		
Csng reduc:	0	Top perf:	35
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	11/10/1997
Gravel p 1:	33	Gravel p 2:	50
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004596		

AU384
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004595**

Well log:	27245	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	J		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/30/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	42	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	42
Csng diame:	8		
Csng reduc:	0	Top perf:	0
Bottom per:	0	Perf inter:	0
Static wl:	30		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/09/1997
Edit statu:	F	Well start:	08/30/1983
Gravel p 1:	20	Gravel p 2:	42
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004595		

AU385
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004598**

Well log:	69540	App:	Not Reported
Notice of :	16522	Waiver no:	Not Reported
Date log r:	12/09/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/11/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	40	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2.25		
Csng reduc:	0	Top perf:	25
Bottom per:	40	Perf inter:	1
Static wl:	28		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	11/11/1997
Gravel p 1:	23	Gravel p 2:	40
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004598		

AU386
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004597**

Well log:	69539	App:	Not Reported
Notice of :	16522	Waiver no:	Not Reported
Date log r:	12/09/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/01/1997	Date cmplt:	M
Gravel pac:	Y	Depth seal:	30
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.25		
Csng reduc:	0	Top perf:	35
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	11/01/1997
Gravel p 1:	33	Gravel p 2:	50

Utm x:	678970.152747
Utm y:	3991644.2062
Site id:	NV4000000004597

AU387
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004592**

Well log:	27242	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	B		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/29/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	28
Depth dril:	55	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	55
Csng diame:	8		
Csng reduc:	0	Top perf:	32
Bottom per:	47	Perf inter:	1
Static wl:	26		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/09/1997
Edit statu:	F	Well start:	08/27/1983
Gravel p 1:	28	Gravel p 2:	55
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004592		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AU388 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004591**

Well log:	27241	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	A		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/31/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	42	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	44
Csng diame:	8		
Csng reduc:	0	Top perf:	22
Bottom per:	42	Perf inter:	1
Static wl:	22		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/09/1997
Edit statu:	F	Well start:	08/30/1983
Gravel p 1:	20	Gravel p 2:	42
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004591		

AU389 **NW** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004594**

Well log:	27244	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	D		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/23/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	21
Depth dril:	44	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	46
Csng diame:	8		
Csng reduc:	0	Top perf:	29
Bottom per:	39	Perf inter:	1
Static wl:	29		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/09/1997
Edit statu:	F	Well start:	08/22/1983
Gravel p 1:	21	Gravel p 2:	44
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004594		

AU390
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004593**

Well log:	27243	App:	Not Reported
Notice of :	0	Waiver no:	Not Reported
Date log r:	04/19/1985	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	D	Drilling m:	H
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA

Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	STAUFFER CHEMICAL CO		
Owner addr:	1391 S 49TH RICHMOND CA 94804		
Owner no:	C		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	08/29/1983	Date cmplt:	D
Gravel pac:	Y	Depth seal:	18
Depth dril:	42	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	44
Csng diame:	8		
Csng reduc:	0	Top perf:	27
Bottom per:	37	Perf inter:	1
Static wl:	29		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	F
Qual lith :	F		
Remarks ad:	Not Reported		
Contractor:	4286A		
Contract 1:	THOMPSON DRILLING CO INC		
Contract 2:	4185 W HARMON LAS VEGAS NV 89103		
Contract 3:	582		
Driller li:	856	Source age:	NV003
User id:	NAFLECKS	Date entry:	09/16/2009
Update use:	dsdavis	Date updat:	07/09/1997
Edit statu:	F	Well start:	08/29/1983
Gravel p 1:	18	Gravel p 2:	42
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004593		

AU391
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004599**

Well log:	69541	App:	Not Reported
Notice of :	16522	Waiver no:	Not Reported
Date log r:	12/09/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/11/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	20
Depth dril:	40	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	40
Csng diame:	2.25		
Csng reduc:	0	Top perf:	25
Bottom per:	40	Perf inter:	1
Static wl:	28		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	11/11/1997
Gravel p 1:	23	Gravel p 2:	40
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004599		

AU392
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004605**

Well log:	70822	App:	Not Reported
Notice of :	17394	Waiver no:	Not Reported
Date log r:	03/17/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-14-302-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/11/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4.25		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/1998
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	02/11/1998
Gravel p 1:	38	Gravel p 2:	60
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004605		

AU393
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004604**

Well log:	70821	App:	Not Reported
Notice of :	17394	Waiver no:	Not Reported
Date log r:	03/17/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-14-302-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/11/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	45
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	4.25		
Csng reduc:	0	Top perf:	50
Bottom per:	70	Perf inter:	1
Static wl:	59		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/1998
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	02/10/1998
Gravel p 1:	48	Gravel p 2:	70

Utm x:	678970.152747
Utm y:	3991644.2062
Site id:	NV4000000004604

AU394
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004607**

Well log:	70824	App:	Not Reported
Notice of :	17394	Waiver no:	Not Reported
Date log r:	03/17/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-14-302-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/10/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	45
Depth dril:	70	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	70
Csng diame:	4.25		
Csng reduc:	0	Top perf:	50
Bottom per:	70	Perf inter:	1
Static wl:	61		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/1998
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	02/10/1998
Gravel p 1:	48	Gravel p 2:	70
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004607		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

AU395
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004606**

Well log:	70823	App:	Not Reported
Notice of :	17394	Waiver no:	Not Reported
Date log r:	03/17/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-14-302-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/12/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	60	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	60
Csng diame:	4.25		
Csng reduc:	0	Top perf:	40
Bottom per:	60	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/1998
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	02/12/1998
Gravel p 1:	38	Gravel p 2:	60
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004606		

AU396
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004601**

Well log:	69543	App:	Not Reported
Notice of :	16522	Waiver no:	Not Reported
Date log r:	12/09/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/10/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	30
Depth dril:	50	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	50
Csng diame:	2.25		
Csng reduc:	0	Top perf:	35
Bottom per:	50	Perf inter:	1
Static wl:	38		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	11/10/1997
Gravel p 1:	33	Gravel p 2:	50
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004601		

AU397
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004600**

Well log:	69542	App:	Not Reported
Notice of :	16522	Waiver no:	Not Reported
Date log r:	12/09/1997	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA

Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 W LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	Not Reported	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	11/12/1997	Date cmplt:	D
Gravel pac:	Y	Depth seal:	15
Depth dril:	35	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	35
Csng diame:	2.25		
Csng reduc:	0	Top perf:	20
Bottom per:	35	Perf inter:	1
Static wl:	22		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	12/30/1997
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	11/12/1997
Gravel p 1:	20	Gravel p 2:	35
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004600		

AU398
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004603**

Well log:	70820	App:	Not Reported
Notice of :	17394	Waiver no:	Not Reported
Date log r:	03/17/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-14-302-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	02/10/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	70	Depth bedr:	0

Aquifer de:	Not Reported	Depth case:	70
Csng diame:	4.25		
Csng reduc:	0	Top perf:	40
Bottom per:	70	Perf inter:	1
Static wl:	47		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/1998
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	02/10/1998
Gravel p 1:	38	Gravel p 2:	70
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004603		

AU399
NW
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004602**

Well log:	70819	App:	Not Reported
Notice of :	17394	Waiver no:	Not Reported
Date log r:	03/17/1998	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	11	Sec quarte:	AA
Legal quar:	NE NE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	115	Lat long s:	NV003
Lat long a:	T		
Owner curr:	PIONEER CHLOR-ALKALI CO		
Owner addr:	8000 E LAKE MEAD DR		
Owner no:	Not Reported		
Parcel no:	178-14-302-001	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	03/11/1998	Date cmplt:	D
Gravel pac:	Y	Depth seal:	35
Depth dril:	65	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	65
Csng diame:	4.25		
Csng reduc:	0	Top perf:	40
Bottom per:	65	Perf inter:	1
Static wl:	42		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G

Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	39528		
Contract 1:	WEBER ENVIRONMENTAL INC		
Contract 2:	115 S WEBER DR STE 1 CHANDLER AZ 85226		
Contract 3:	0		
Driller li:	2057	Source age:	NV003
User id:	DBRANTLEY	Date entry:	03/31/1998
Update use:	Not Reported	Date updat:	07/09/1997
Edit statu:	F	Well start:	03/11/1998
Gravel p 1:	38	Gravel p 2:	65
Utm x:	678970.152747		
Utm y:	3991644.2062		
Site id:	NV4000000004602		

AV400
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004790**

Well log:	87614	App:	Not Reported
Notice of :	24498	Waiver no:	Not Reported
Date log r:	02/06/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/31/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	7
Depth dril:	25	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	24
Csng diame:	4		
Csng reduc:	0	Top perf:	9
Bottom per:	24	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2183	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/27/2003
Update use:	DBRANTLEY	Date updat:	03/18/2003
Edit statu:	F	Well start:	01/31/2003
Gravel p 1:	7	Gravel p 2:	24

Utm x:	680563.399838
Utm y:	3992077.6478
Site id:	NV4000000004790

AV401
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004789**

Well log:	87613	App:	Not Reported
Notice of :	24498	Waiver no:	Not Reported
Date log r:	02/06/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/30/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	4
Depth dril:	23	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	22
Csng diame:	4		
Csng reduc:	0	Top perf:	7
Bottom per:	22	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2183	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/27/2003
Update use:	DBRANTLEY	Date updat:	03/18/2003
Edit statu:	F	Well start:	01/30/2003
Gravel p 1:	4	Gravel p 2:	22
Utm x:	680563.399838		
Utm y:	3992077.6478		
Site id:	NV4000000004789		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
AV402 **NNE** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004791**

Well log:	87615	App:	Not Reported
Notice of :	24498	Waiver no:	Not Reported
Date log r:	02/06/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/31/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	7
Depth dril:	25	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	25
Csng diame:	4		
Csng reduc:	0	Top perf:	9
Bottom per:	25	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2183	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/27/2003
Update use:	DBRANTLEY	Date updat:	03/18/2003
Edit statu:	F	Well start:	01/31/2003
Gravel p 1:	7	Gravel p 2:	25
Utm x:	680563.399838		
Utm y:	3992077.6478		
Site id:	NV4000000004791		

AV403 **NNE** **1/2 - 1 Mile** **Lower**	**NV WELLS**	**NV4000000004793**

Well log:	87617	App:	Not Reported
Notice of :	24498	Waiver no:	Not Reported
Date log r:	02/06/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DD
Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/30/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	4
Depth dril:	23	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	22
Csng diame:	4		
Csng reduc:	0	Top perf:	7
Bottom per:	22	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2183	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/27/2003
Update use:	DBRANTLEY	Date updat:	03/18/2003
Edit statu:	F	Well start:	01/30/2003
Gravel p 1:	4	Gravel p 2:	22
Utm x:	680563.399838		
Utm y:	3992077.6478		
Site id:	NV4000000004793		

AV404
NNE
1/2 - 1 Mile
Lower

NV WELLS **NV4000000004792**

Well log:	87616	App:	Not Reported
Notice of :	24498	Waiver no:	Not Reported
Date log r:	02/06/2003	Date log 1:	D
Site type:	N	Work type:	N
Work type :	Not Reported		
Proposed u:	G	Drilling m:	B
Sc:	32003	Ha:	212
Twn:	S22	Legal twn:	22S
Rng:	E62	Legal rng:	62E
Sec:	01	Sec quarte:	DD

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Legal quar:	SE SE	Quarters s:	Not Reported
Ref:	MD	Latitude:	36
Longitude:	114	Lat long s:	NV003
Lat long a:	M		
Owner curr:	CONOCO PHILLIPS CO		
Owner addr:	1324 BOULDER HWY		
Owner no:	Not Reported		
Parcel no:	178-01-810-134	Subdivisio:	Not Reported
Lot no:	Not Reported	Block no:	Not Reported
Well finis:	01/31/2003	Date cmplt:	D
Gravel pac:	Y	Depth seal:	6
Depth dril:	23	Depth bedr:	0
Aquifer de:	Not Reported	Depth case:	23
Csng diame:	4		
Csng reduc:	0	Top perf:	8
Bottom per:	23	Perf inter:	1
Static wl:	0		
Temperatur:	0		
Yield:	0		
Drawdown:	0		
Hours pump:	0		
Test metho:	Not Reported	Qual const:	G
Qual lith :	G		
Remarks ad:	Not Reported		
Contractor:	12852		
Contract 1:	WATER DEVELOPMENT CORP (THE)		
Contract 2:	1202 E KENTUCKY AVE WOODLAND CA 95776		
Contract 3:	0		
Driller li:	2183	Source age:	NV003
User id:	DBRANTLEY	Date entry:	01/27/2003
Update use:	Not Reported	Date updat:	03/18/2003
Edit statu:	F	Well start:	01/31/2003
Gravel p 1:	6	Gravel p 2:	23
Utm x:	680563.399838		
Utm y:	3992077.6478		
Site id:	NV4000000004792		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: NV Radon

Radon Test Results

# Tests	# < 4 pci/L	# > 4 pCi/L	% > 4 pCi/L	Average	Max
11	10	1	9.09	2.22	9.9

Federal EPA Radon Zone for CLARK County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 89015

Number of sites tested: 9

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	1.256 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	3.400 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Nevada Well Log Database
Source: Dept of Conservation and Natural Resources, Division of Water Resources
Telephone: 775-687-4380

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Database
Source: Nevada Bureau of Mines and Geology
Telephone: 775-784-6691
Oil and gas well location in the state of Nevada.

RADON

State Database: NV Radon
Source: State Health Division
Telephone: 775-687-7531
Radon Test Results By Zip Code

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Appendix B

Historical Research Documentation

Appendix B.1

Aerial Photographs

Tronox
560 W Lake Mead Parkway
Henderson, NV 89015

Inquiry Number: 2938729.5
December 09, 2010

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography December 09, 2010

Target Property:

560 W Lake Mead Parkway

Henderson, NV 89015

Year	*Scale*	*Details*	*Source*
1950	Aerial Photograph. Scale: 1"=1000'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: July 11, 1950	EDR
1958	Aerial Photograph. Scale: 1"=1000'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: July 11, 1958	EDR
1965	Aerial Photograph. Scale: 1"=500'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: May 18, 1965	EDR
1969	Aerial Photograph. Scale: 1"=750'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: July 08, 1969	EDR
1973	Aerial Photograph. Scale: 1"=1000'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: October 30, 1973	EDR
1977	Aerial Photograph. Scale: 1"=750'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: June 19, 1977	EDR
1980	Aerial Photograph. Scale: 1"=1000'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: October 05, 1980	EDR
1985	Aerial Photograph. Scale: 1"=750'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: February 07, 1985	EDR
1990	Aerial Photograph. Scale: 1"=750'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: April 25, 1990	EDR
1999	Aerial Photograph. Scale: 1"=750'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: September 28, 1999	EDR
2006	Aerial Photograph. Scale: 1"=604'	Panel #: 36115-A1, Las Vegas SE, NV;/Flight Date: January 01, 2006	EDR


INQUIRY #: 2938729.5
YEAR: 1950
= 1000'
N


INQUIRY #: 2938729.5
YEAR: 1958
= 1000'
N
EDR Environmental Data Resources Inc


INQUIRY #: 2938729.5
YEAR: 1965
= 500'
N
EDR Environmental Data Resources Inc

INQUIRY #: 2938729.5

YEAR: 1969

= 750'

N

EDR Environmental Data Resources Inc


INQUIRY #: 2938729.5
YEAR: 1973
= 1000'
N


INQUIRY #: 2938729.5
YEAR: 1977
= 750'
N
EDR Environmental Data Resources Inc


INQUIRY #: 2938729.5
YEAR: 1980
= 1000'
N


INQUIRY #: 2938729.5
YEAR: 1985
= 750'
N
EDR Environmental Data Resources Inc


INQUIRY #: 2938729.5
YEAR: 1990
= 750'
N


INQUIRY #: 2938729.5
YEAR: 1999
= 750'
N
EDR Environmental Data Resources Inc


INQUIRY #: 2938729.5
YEAR: 2006
= 604'
N

Appendix B.2

Fire Insurance Maps

Tronox
560 W Lake Mead Parkway
Henderson, NV 89015

Inquiry Number: 2938729.3
December 07, 2010

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

12/07/10

Site Name:
Tronox
560 W Lake Mead Parkway
Henderson, NV 89015

Client Name:
Environ Corporation
6001 Shellmound Street
Emeryville, CA 94608

EDR Inquiry # 2938729.3

Contact: Wendy Seider

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Environ Corporation were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: Tronox
Address: 560 W Lake Mead Parkway
City, State, Zip: Henderson, NV 89015
Cross Street:
P.O. # NA
Project: NA
Certification # 3190-4838-9845

Sanborn® Library search results
Certification # 3190-4838-9845

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

Environ Corporation (the client) is permitted to make up to THREE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

Appendix B.3

Topographic Maps

Tronox
560 W Lake Mead Parkway
Henderson, NV 89015

Inquiry Number: 2938729.4
December 07, 2010

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

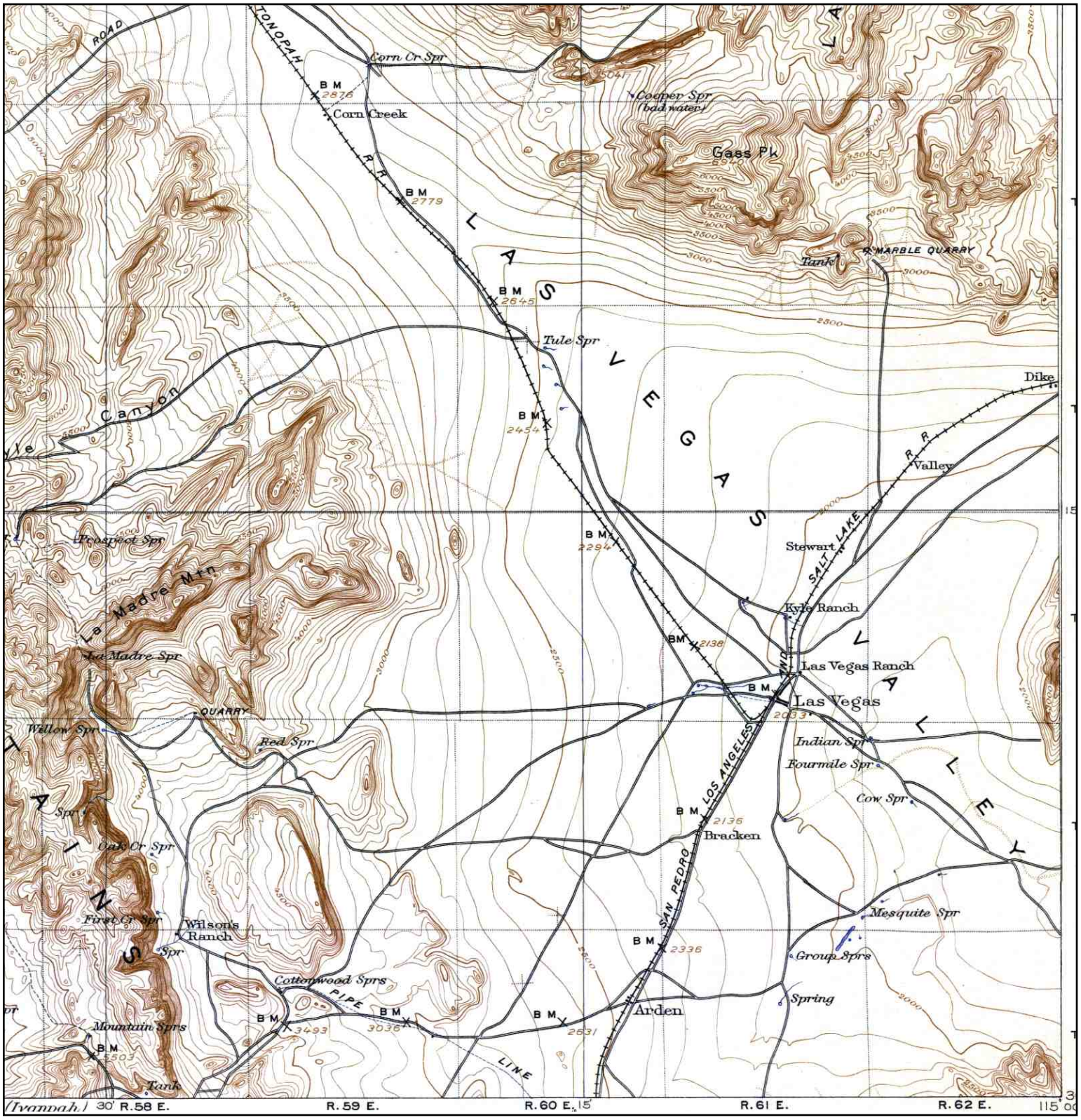
440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

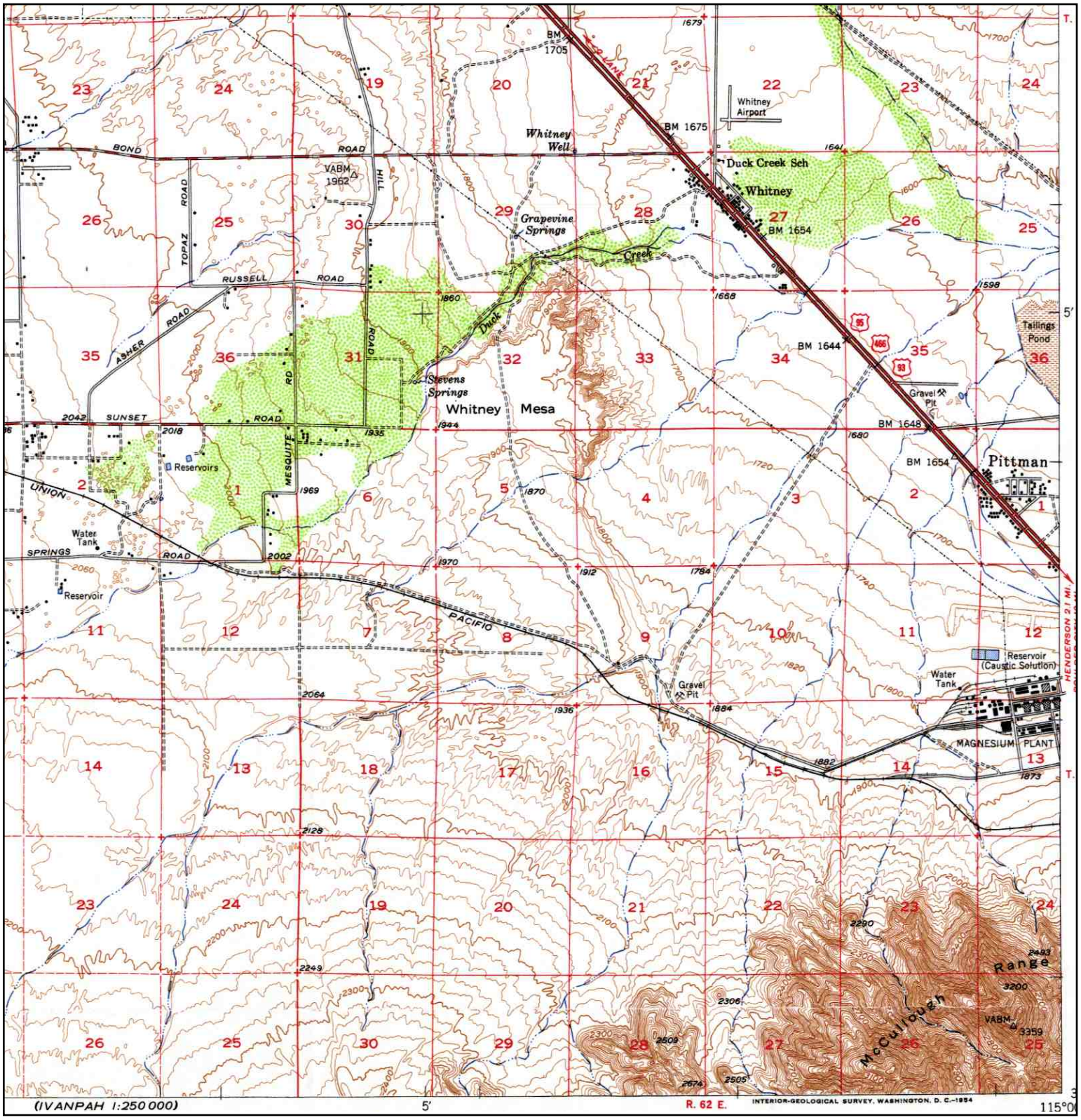
Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map



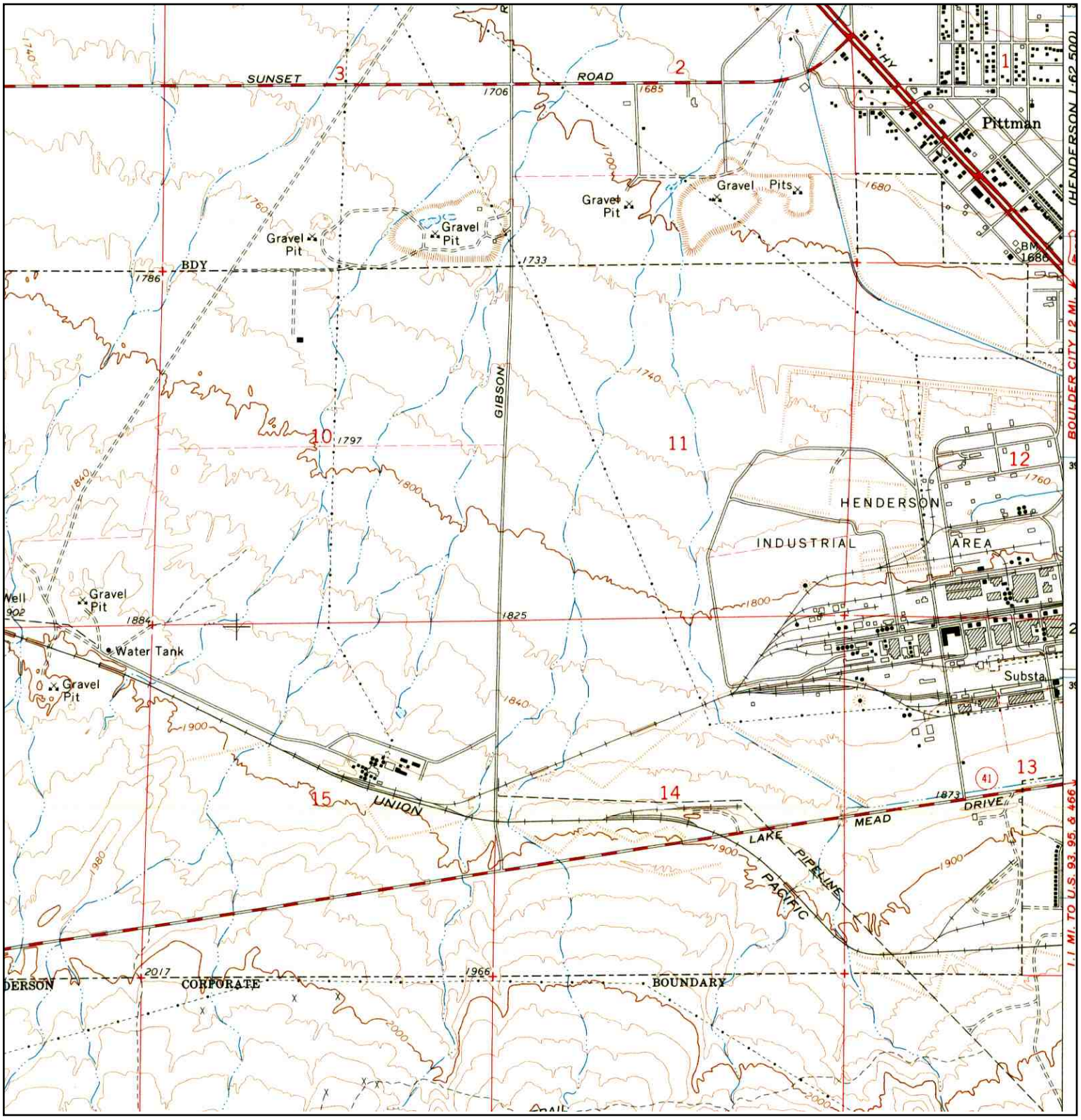
N	TARGET QUAD NAME: LAS VEGAS MAP YEAR: 1908 SERIES: 60 SCALE: 1:250000	SITE NAME: Tronox ADDRESS: 560 W Lake Mead Parkway Henderson, NV 89015 LAT/LONG: 36.0445 / -115.0013	CLIENT: Environ Corporation CONTACT: Wendy Seider INQUIRY#: 2938729.4 RESEARCH DATE: 12/07/2010

Historical Topographic Map



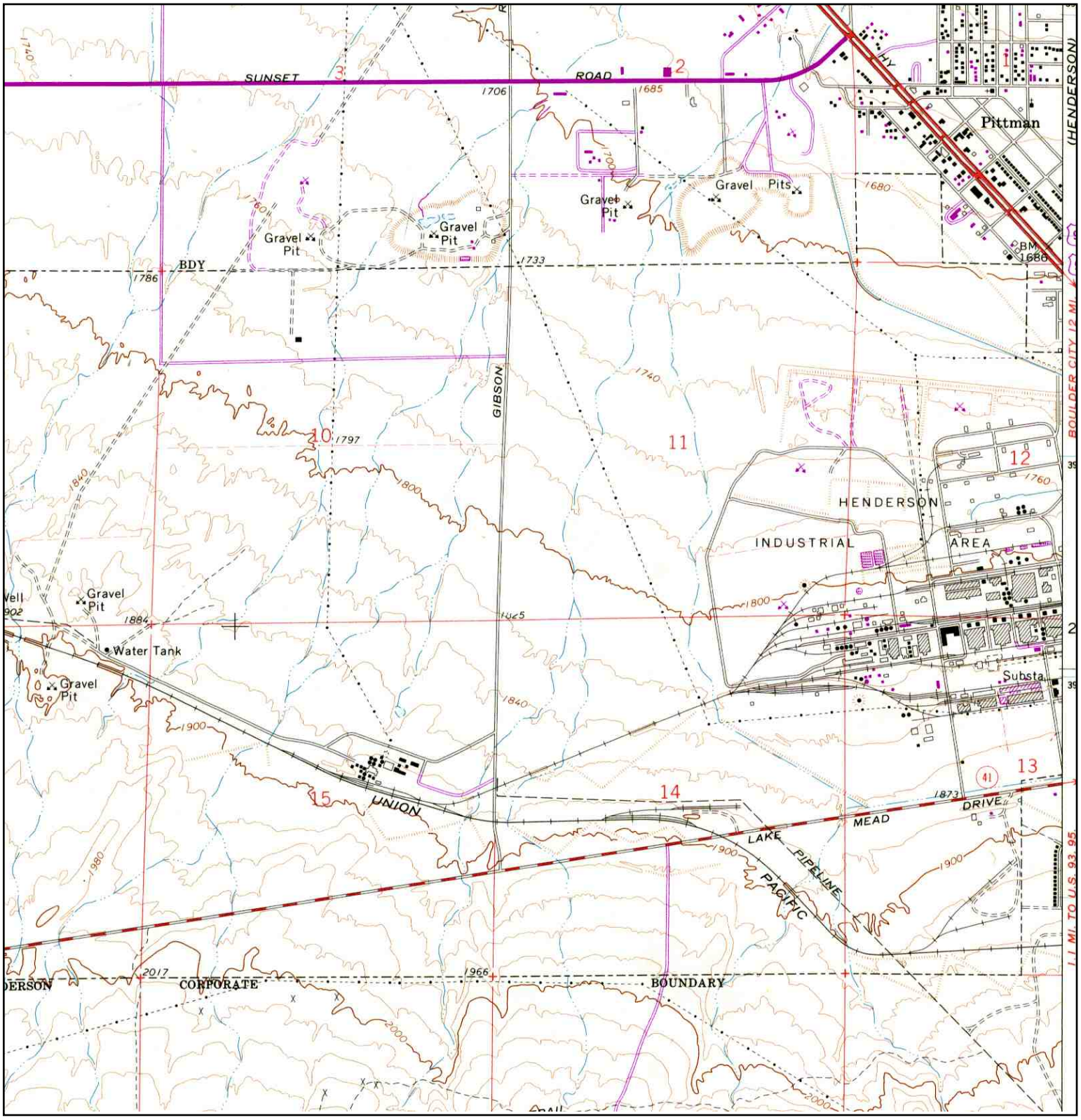
N	TARGET QUAD NAME: LAS VEGAS MAP YEAR: 1952 SERIES: 15 SCALE: 1:62500	SITE NAME: Tronox ADDRESS: 560 W Lake Mead Parkway Henderson, NV 89015 LAT/LONG: 36.0445 / -115.0013	CLIENT: Environ Corporation CONTACT: Wendy Seider INQUIRY#: 2938729.4 RESEARCH DATE: 12/07/2010

Historical Topographic Map



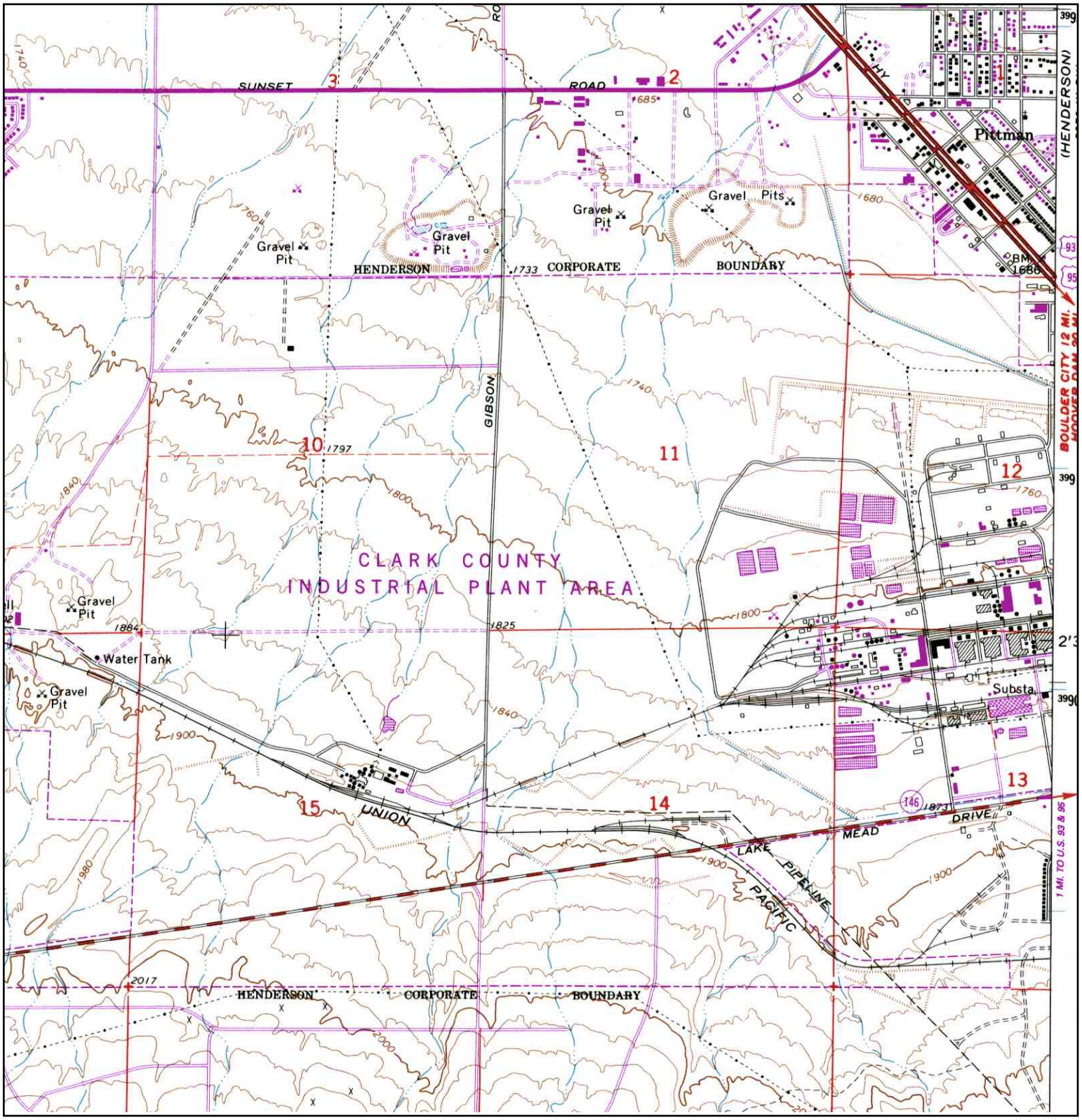
N	TARGET QUAD		SITE NAME:	Tronox	CLIENT:	Environ Corporation
	NAME:	LAS VEGAS SE	ADDRESS:	560 W Lake Mead Parkway	CONTACT:	Wendy Seider
	MAP YEAR:	1967		Henderson, NV 89015	INQUIRY#:	2938729.4
			LAT/LONG:	36.0445 / -115.0013	RESEARCH DATE:	12/07/2010
	SERIES:	7.5				
	SCALE:	1:24000				

Historical Topographic Map



N	TARGET QUAD				
	NAME:	LAS VEGAS SE	SITE NAME:	Tronox	CLIENT: Environ Corporation
	MAP YEAR:	1973	ADDRESS:	560 W Lake Mead Parkway	CONTACT: Wendy Seider
	PHOTOREVISED:	1967		Henderson, NV 89015	INQUIRY#: 2938729.4
	SERIES:	7.5	LAT/LONG:	36.0445 / -115.0013	RESEARCH DATE: 12/07/2010
	SCALE:	1:24000			

Historical Topographic Map



N	TARGET QUAD NAME: LAS VEGAS SE MAP YEAR: 1984 PHOTOREVISED:1967 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Tronox ADDRESS: 560 W Lake Mead Parkway Henderson, NV 89015 LAT/LONG: 36.0445 / -115.0013	CLIENT: Environ Corporation CONTACT: Wendy Seider INQUIRY#: 2938729.4 RESEARCH DATE: 12/07/2010

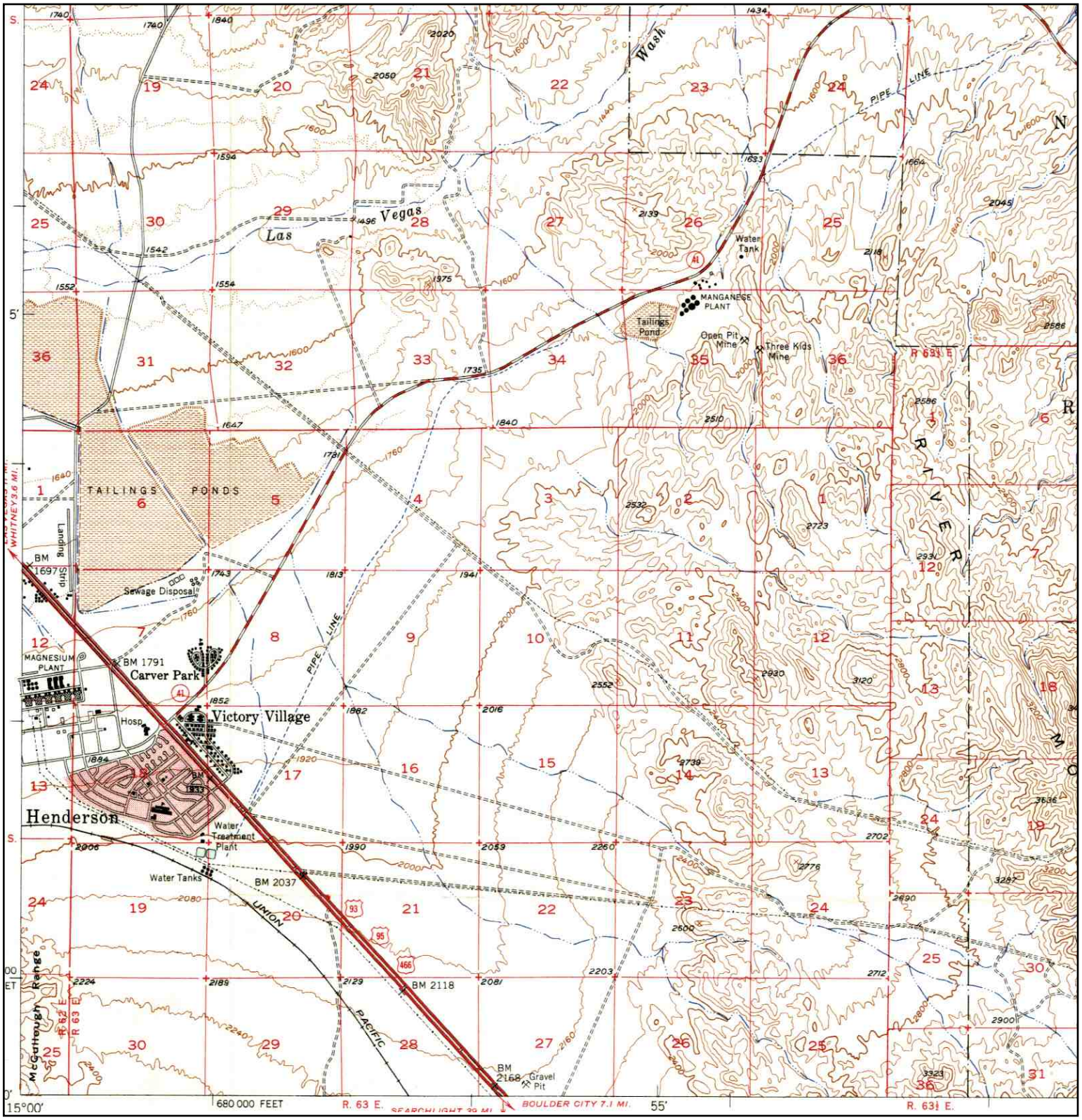
Historical Topographic Map

N	ADJOINING QUAD NAME: SAINT THOMAS MAP YEAR: 1886 SERIES: 60 SCALE: 1:250000	SITE NAME: Tronox ADDRESS: 560 W Lake Mead Parkway Henderson, NV 89015 LAT/LONG: 36.0445 / -115.0013	CLIENT: Environ Corporation CONTACT: Wendy Seider INQUIRY#: 2938729.4 RESEARCH DATE: 12/07/2010

Historical Topographic Map

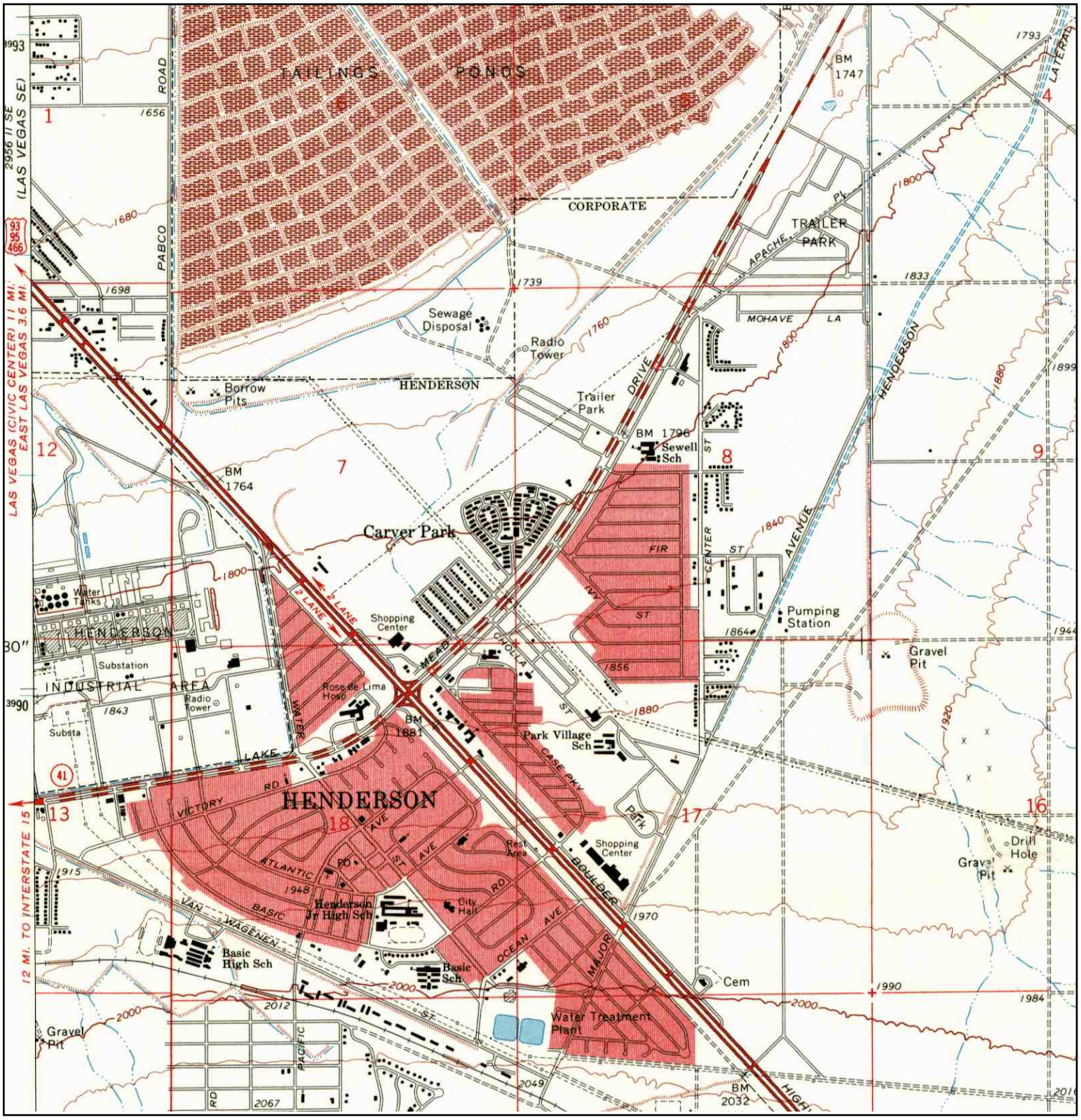
N	ADJOINING QUAD NAME: BOULDER CANYON MAP YEAR: 1926 SERIES: 30 SCALE: 1:96000	SITE NAME: Tronox ADDRESS: 560 W Lake Mead Parkway Henderson, NV 89015 LAT/LONG: 36.0445 / -115.0013	CLIENT: Environ Corporation CONTACT: Wendy Seider INQUIRY#: 2938729.4 RESEARCH DATE: 12/07/2010

Historical Topographic Map



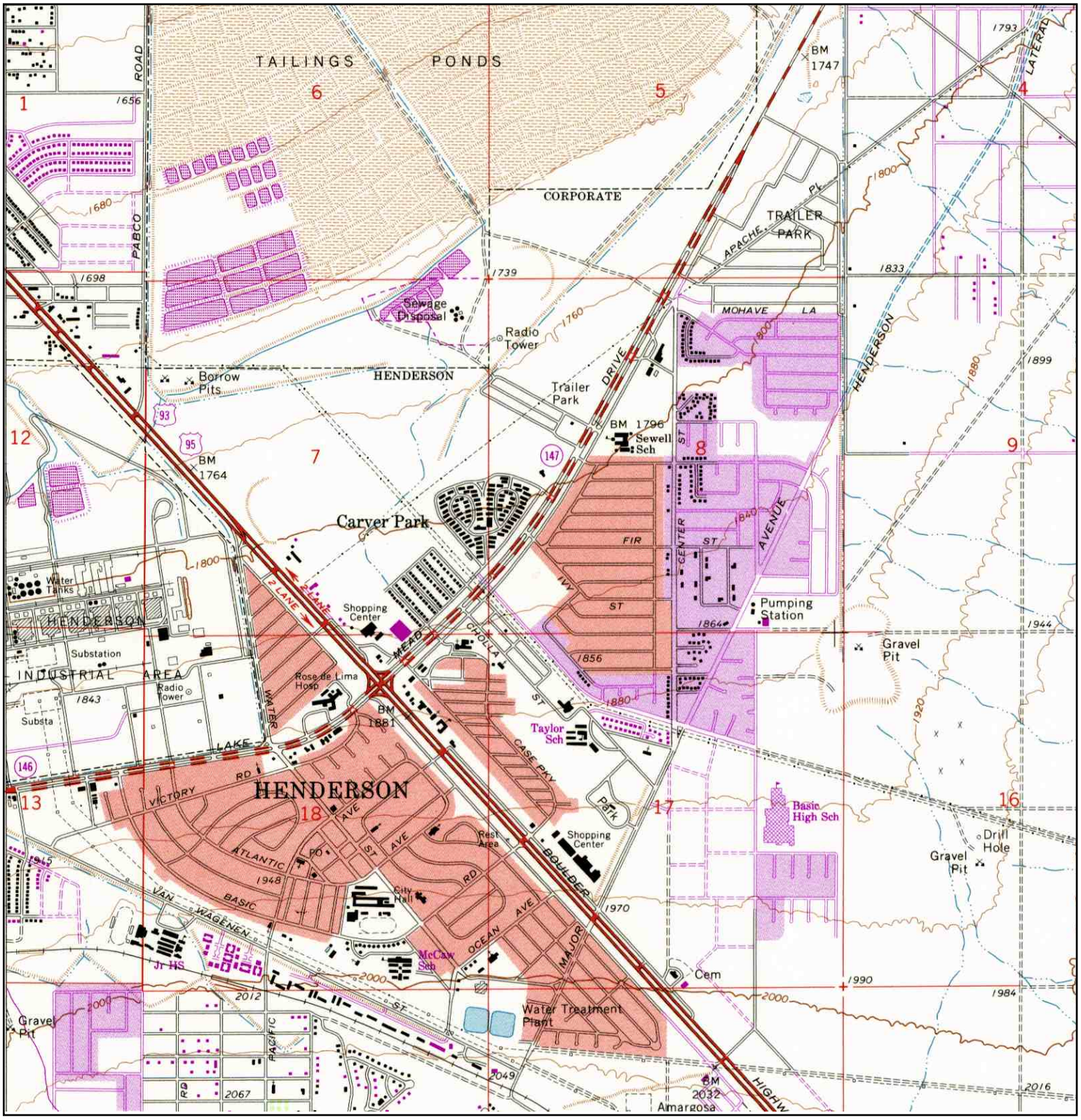
N	ADJOINING QUAD NAME: HENDERSON MAP YEAR: 1952 SERIES: 15 SCALE: 1:62500	SITE NAME: Tronox ADDRESS: 560 W Lake Mead Parkway Henderson, NV 89015 LAT/LONG: 36.0445 / -115.0013	CLIENT: Environ Corporation CONTACT: Wendy Seider INQUIRY#: 2938729.4 RESEARCH DATE: 12/07/2010

Historical Topographic Map



N	ADJOINING QUAD				
	NAME:	HENDERSON	SITE NAME:	Tronox	CLIENT: Environ Corporation
	MAP YEAR:	1970	ADDRESS:	560 W Lake Mead Parkway	CONTACT: Wendy Seider
				Henderson, NV 89015	INQUIRY#: 2938729.4
	SERIES:	7.5	LAT/LONG:	36.0445 / -115.0013	RESEARCH DATE: 12/07/2010
	SCALE:	1:24000			

Historical Topographic Map



N	ADJOINING QUAD				
	NAME:	HENDERSON	SITE NAME:	Tronox	CLIENT: Environ Corporation
	MAP YEAR:	1983	ADDRESS:	560 W Lake Mead Parkway	CONTACT: Wendy Seider
	PHOTOREVISED:	1970		Henderson, NV 89015	INQUIRY#: 2938729.4
	SERIES:	7.5	LAT/LONG:	36.0445 / -115.0013	RESEARCH DATE: 12/07/2010
	SCALE:	1:24000			

Appendix B.4

Abstract of City Directories

Tronox
560 W Lake Mead Parkway
Henderson, NV 89015

Inquiry Number: 2938729.6
December 09, 2010

The EDR-City Directory Abstract

Environmental Data Resources Inc
440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

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SECTION

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Abstract is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Abstract includes a search and abstract of available city directory data. For each address, the directory lists the name of the corresponding occupant at five year intervals.

RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. An "X" indicates where information was identified in the source and provided in this report.

Year	Source	TP	Adjoining	Text Abstract	Source Image
2006	Cole Criss-Cross Directory	-	X	X	-
1975	Mullin-Kille's City Directory	-	-	-	-

FINDINGS

TARGET PROPERTY INFORMATION

ADDRESS

560 W Lake Mead Parkway
Henderson, NV 89015

FINDINGS DETAIL

Target Property research detail.

No Addresses Found

FINDINGS

ADJOINING PROPERTY DETAIL

The following Adjoining Property addresses were researched for this report. Detailed findings are provided for each address.

W Lake Mead Parkway

425 W Lake Mead Parkway

Year	*Uses*	*Source*
2006	D&H Marine	Cole Criss-Cross Directory

433 W Lake Mead Parkway

Year	*Uses*	*Source*
2006	Phillips Furniture Inc	Cole Criss-Cross Directory

505 W Lake Mead Parkway

Year	*Uses*	*Source*
2006	OK Tire Stores	Cole Criss-Cross Directory

575 W Lake Mead Parkway

Year	*Uses*	*Source*
2006	Las Vegas Water Sports	Cole Criss-Cross Directory
	Pro shop Motor Sports marine	Cole Criss-Cross Directory

595 W Lake Mead Parkway

Year	*Uses*	*Source*
2006	Office Building (5 occupants)	Cole Criss-Cross Directory

599 W Lake Mead Parkway

Year	*Uses*	*Source*
2006	Terrible Herbst	Cole Criss-Cross Directory

FINDINGS

STREET NOT IDENTIFIED IN RESEARCH SOURCE

The following Streets were researched for this report, and the Streets were not identified in the research source.

Street Researched	Street Not Identified in Research Source
W Lake Mead Parkway	1975

TARGET PROPERTY: ADDRESS NOT IDENTIFIED IN RESEARCH SOURCE

The following Target Property addresses were researched for this report, and the addresses were not identified in the research source.

Address Researched	Address Not Identified in Research Source
560 W Lake Mead Parkway	2006

ADJOINING PROPERTY: ADDRESSES NOT IDENTIFIED IN RESEARCH SOURCE

The following Adjoining Property addresses were researched for this report, and the addresses were not identified in research source.

Address Researched	Address Not Identified in Research Source
425 W Lake Mead Parkway	No Years Found
433 W Lake Mead Parkway	No Years Found
505 W Lake Mead Parkway	No Years Found
575 W Lake Mead Parkway	No Years Found
595 W Lake Mead Parkway	No Years Found
599 W Lake Mead Parkway	No Years Found

Appendix C

Key Environmental Documents

KLEINFELDER

ENVIRONMENTAL CONDITIONS ASSESSMENT

KERR-MCGEE CHEMICAL CORPORATION

HENDERSON, NEVADA FACILITY

Prepared by

KLEINFELDER, INC.
6850 S. Paradise Road
Las Vegas, Nevada 89119

Prepared for

KERR-MCGEE CHEMICAL CORPORATION
P.O. Box 55
Henderson, Nevada 89015

April 1993

UNAUTHORIZED USE OR COPYING OF THIS DOCUMENT IS STRICTLY PROHIBITED. PLEASE READ THE "LIMITATIONS" SECTION OF THIS REPORT.

A Report Prepared For:

KERR-MCGEE CHEMICAL CORPORATION
P.O. Box 55
Henderson, Nevada 89015

Attention: Mr. Alan Gaddy, Environmental Engineer

Kleinfelder Project No. 31-135909-004

Prepared By:

Todd J. Croft, C.E.M.
Project Geologist

Randolph C. Harris, C.E.M.
Senior Hydrogeologist

Kent E. Zenobia, P.E., C.E.M.
Senior Engineering Consultant

KLEINFELDER, INC.
6850 S. Paradise Road
Las Vegas, Nevada 89119

April 1993

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KERR-MCGEE CHEMICAL CORPORATION
HENDERSON FACILITY

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Plates **Appendix**

1.0 EXECUTIVE SUMMARY

This Environmental Conditions Assessment (ECA) report was prepared for the Kerr-McGee Chemical Corporation (KMCC), Henderson, Nevada facility by Kleinfelder, Inc. to satisfy the requirements of a consent agreement with the Nevada Division of Environmental Protection (NDEP) (Reference K174). KMCC is one of six companies which entered into this consent agreement with the NDEP to conduct environmental studies to assess site specific environmental conditions which are the result of past and present industrial operations and waste disposal practices.

The six companies conducting the studies are current or former operators of facilities within an area known as the Basic Management, Inc. (BMI) complex. The BMI complex is located in unincorporated Clark County and is surrounded by the City of Henderson, Nevada.

The ECA process, to which this report applies, required the collection and review of extensive quantities of existing and historical documents and information. Documents were obtained from the KMCC Henderson, Nevada facility and approximately thirteen (13) non-company sources including the following:

- NDEP;
- Clark County Health District (Environmental Health);
- Clark County Health District (Air Pollution Control Division);
- Colorado River Commission;
- U.S. Bureau of Reclamation (Boulder City, Nevada office);
- Occupational Safety and Health Division - Nevada (Las Vegas, Nevada office);
- Environmental Research Center (UNLV office);
- University of Nevada Las Vegas Library;
- Gibson Library;
- U.S. EPA Region IX (San Francisco, California office);
- Ecology and Environment, Inc. (San Francisco, California office);

- Desert Research Institute (Las Vegas, Nevada office); and
- U.S. EPA Environmental Monitoring Systems Laboratory (Las Vegas, Nevada office).

The organization of this draft report closely follows the format approved by the NDEP and presents the information developed from extensive document reviews, interviews and site tours or site reconnaissance of various portions specific to the KMCC facility. This draft report (Rev. 2.7) incorporates revisions based upon NDEP comments dated May 6, 1992. Recommendations have not been formulated at this time. Recommendations will be developed and incorporated at a later date and will be subject to NDEP review and comment.

Site use history from 1941 through current is presented in Section 3.0. This information includes a summary of U. S. Government activities, previous operating companies, and subsequent KMCC activities. The information presented regarding U.S. Government operations is also discussed in the common area study developed by Geraghty & Miller, Inc., which may contain additional materials unknown to KMCC at the time of their review. Local and regional hydrogeologic conditions are also summarized in this section.

Process descriptions for 13 chemical manufacturing activities identified as having occurred in the area now controlled by KMCC are provided in Section 4.0. These descriptions include processes both currently or formerly operated by KMCC and its predecessors.

Descriptions of thirty one (31) solid waste management units (SWMUs) are presented in Section 5.0. These SWMUs include areas on the KMCC site where wastes are known to have been managed by KMCC, other companies, or the U. S. Government.

Areas of known or suspected releases or spills are presented in Section 6.0. Twenty (20) such areas were identified.

Miscellaneous site activities are presented in Section 7.0. These include tenant activities and KMCC disposal to BMI complex common areas. Where overlap occurs concerning information presented in Sections 5.0 and 6.0, it is so referenced.

This report is subject to limitations as presented in Section 2.4 of this report. Unauthorized use or copying of this document is strictly prohibited.

2.0 INTRODUCTION

2.1 Requirements of the Consent Agreement

On April 25, 1991 six companies [including Kerr-McGee Chemical Corporation (KMCC)], which currently or formerly operated a facility at the Basic Management, Inc. (BMI) complex, entered into a Consent Agreement with the Nevada Division of Environmental Protection (NDEP) to complete individual site specific environmental studies (Reference K174). The purpose of the site specific studies is to assess environmental conditions which reflect past and present industrial operations and waste management activities of the individual companies.

The NDEP refers to this study as a "Phase I Environmental Conditions Assessment". The companies (including KMCC) are required to extend their "best efforts to determine, identify, evaluate or otherwise collect documentary information regarding":

- *all past and present industrial processes conducted and the solid waste, hazardous wastes and air pollutants generated by such industrial processes;*
- *all known or suspected, active or inactive, solid waste or hazardous waste treatment, storage, disposal or management units or areas, together with information regarding specific types, volumes and sources of waste placed in such units or areas, regardless of whether such units or areas were active on or after November 19, 1980;*
- *all known or suspected releases or spills (whether or not ongoing and irrespective of the date of occurrence) of any hazardous substance, regulated substance, hazardous constituent, pollutant or contaminant into the environment (as "environment" is defined in section 101(8) of CERCLA, 42 U.S.C. section 9601(8)), which, had any such release or spill occurred on or after the effective date of this Consent Agreement, would trigger the notification or reporting requirements of section 311 of the federal Clean Water Act, 33 U.S.C. section 1321, section 103 of CERCLA, 42 U.S.C. section 9603, sections 304 or 313 of the federal Emergency Planning and Community Right-To-Know Act, 42 U.S.C. sections 11004 or 11023, or regulations promulgated pursuant to section 9003 of RCRA, 42 U.S.C. section 6991b;*
- *where reportable quantities have not been established by the laws cited in Section 2(c) (iii) (Reference K174), all known or suspected releases or spills, whether or not on-going and irrespective of the date of occurrence, of a greater than de minimis quantity (as determined by the division) of such hazardous substance, regulated substance, hazardous constituent, pollutant or contaminant into the environment with respect*

to which any documentation exists in the control or possession of the Companies or Company, as applicable, or is otherwise identified during the Phase I environmental conditions assessments required by this Consent Agreement. A de minimis quantity determination with respect to a specific substance shall be made by the Division within 10 days following the submittal of a written request for such a determination;

- *all current and prior owners or operators of all or any portion of the relevant site or area, all corporate successors to such entities, and the specific dates of such ownership, operation and corporate succession;*

- *all records, data, findings, studies, investigation or inspection reports, or any other indications that the soil, surface water, groundwater or air at or in the vicinity of the BMI complex, any Individual Company Site, any BMI Common Area or any Off-Site Waste Management Area is, was, or may be contaminated with any hazardous substance, regulated substance, hazardous constituent, pollutant or contaminant as a result of any industrial or waste management operations associated with the BMI Complex; and*

- *all measures which have been, or are being, undertaken to monitor, characterize, prevent or mitigate the release into the environment from the relevant site or area of any hazardous substance, regulated substance, hazardous constituent, pollutant or contaminant, including associated design, construction, operation, and maintenance information.*

Pertinent data and information developed to address the above points are to be placed into a report and submitted to the NDEP for review and comments. The NDEP is to provide comments regarding the report and, if deemed necessary, conduct a Visual Site Inspection (VSI). The report is to be revised to address NDEP comments and results of any VSI. The NDEP is to notify KMCC as to whether sampling of certain identified areas is necessary. If sampling is not required, the report is final. In the event that sampling is required, a sampling plan is to be submitted to the NDEP for review and comment.

2.2 Purpose and Scope of the Environmental Conditions Assessment (ECA)

2.2.1 Purpose of the ECA

The purpose of the KMCC ECA is to document KMCC site specific environmental impacts resulting from past or present industrial activities.

The requirements set forth by the NDEP for the ECA generally incorporate elements of the RCRA Facility Assessment (RFA) guidance document. The ECA is comprised of the following three elements:

- o a description of site activities;
- o information on releases at the facility; and
- o information on solid waste management units (SWMUs) and other areas of potential concern for releases to various environmental media.

2.2.2 Scope of the ECA

The scope of the ECA includes activities to provide information on the environmental status of the site area controlled by KMCC. SWMUs and other areas of known or suspected releases, spills, discharges, and contamination are to be identified and assessed concerning their potential for environmental impact. This assessment is to include an evaluation of releases to the following media:

- o soils;
- o surface water;
- o groundwater; and
- o air (if the air release is depositional in nature).

The assessment conducted to date includes the following three stages:

- o a review of documents;
- o interviews; and
- o site visit or reconnaissance.

These three stages were conducted successively to build upon the information developed in each stage. During this evaluation, five general information categories consisting of unit characteristics, waste characteristics, contaminant migration pathways, evidence of release, and exposure potential were reviewed and evaluated (Reference Section 2.3.1 of this report).

Elements of the three stages outlined previously are further described below in the following paragraphs.

Preliminary Review (PR)

The Preliminary Review (PR) is a detailed review of existing site information. This information is collected through a review of KMCC facility files and a review of regulatory agency files.

Interviews

Interviews are conducted as needed to gain, as much as possible, first hand recollection of information. This information is evaluated to:

- o assess facility waste generation processes;
- o locate and assess SWMUs; and;
- o locate and assess other areas of known or suspected releases or spills.

Site Visit or Reconnaissance

Site visits are conducted to observe the operations and waste management practices and locations. This information is used in conjunction with the document review and interviews to develop a description of management activities and waste placement areas sufficient to make evaluations.

SWMUs and areas of known or suspected releases are visited and observations recorded. Photographs may be collected to document the status of SWMUs and other areas of interest.

2.3 Technical Approach to the ECA Process

A workplan, dated June 28, 1991, was prepared by Kleinfelder and submitted to the NDEP in accordance with the consent agreement. The NDEP reviewed the workplan and indicated that the workplan was approved contingent upon inclusion of a list of amendments and clarifying statement (Reference K182). The approved revised workplan outlined the technical approach (methodology) to be followed during preparation of this report (Reference K181). The following paragraphs provide a summary of the ECA methodology.

2.3.1 Preliminary Review (PR)

The Preliminary Review (PR) conducted for this project included three primary components: (1) a document inventory, (2) interviews, and (3) site visits.

Document Inventory

The document inventory process was conducted by Kleinfelder, Kerr-McGee, and Geraghty & Miller, Inc. employees. Reports, documents, and records from company and non-company sources that addressed waste generation and management activities were copied and catalogued. Kleinfelder was provided access to KMCC files relevant to those activities. The reviewed documents included information on the industrial processes, chemicals produced, waste materials, waste disposal practices, remediation programs, and tenants.

Pertinent information was also obtained from several NDEP identified non-company sources. The NDEP and Geraghty & Miller, Inc. contacted each of these proposed information sources for access to their files/records. Kleinfelder and/or Kerr-McGee employees obtained information from the following sources:

- Clark County Health District (Environmental Health);
- Clark County Health District (Air Pollution Control Division);
- Colorado River Commission;
- U.S. Bureau of Reclamation (Boulder City, Nevada office);
- Occupational Safety and Health Division - Nevada (Las Vegas, Nevada office); and
- Environmental Research Center (UNLV office).
- U.S. EPA Region IX (San Francisco, California office); and
- Ecology and Environment, Inc. (San Francisco, California office).

Geraghty & Miller, Inc. coordinated the visits to non-company sources permitting file access. Geraghty & Miller, Inc. also conducted a review of the NDEP files, copied and catalogued by company, and shipped these file copies to the KMCC facility. Kleinfelder employees subsequently reviewed the KMCC portion of the NDEP files.

Additional information was also obtained from other sources not specifically identified by the NDEP. These sources included the UNLV Library, Las Vegas, Nevada and the Gibson Library, Henderson, Nevada. Timet and Chemstar also provided relevant copies of documents found during their file review at some of these sources.

Geraghty & Miller, Inc. initiated a "Freedom of Information Act" request to the U.S. EPA Region IX to gain access to U.S. EPA files and their contractor's (Ecology and Environment) files. Documents and information provided to Geraghty & Miller, Inc. by the Desert Research Institute (Las Vegas, Nevada office) and the U.S. EPA Environmental Monitoring Systems Laboratory (Las Vegas, Nevada office) were subsequently distributed to Kleinfelder and KMCC.

Interviews

Interviews were conducted throughout the PR process in an attempt to fill data gaps and augment details of process activities and associated waste generation and disposal. These interviews were conducted during file reviews, site reconnaissance trips, or site tours of the manufacturing processes.

Site Visits

Several site visits were conducted during the ECA process. These visits were termed facility tours or reconnaissance trips.

Tours of the KMCC facility manufacturing process areas were conducted with the KMCC personnel to gain information on the process operations. Information obtained during these tours was used to understand the industrial process and provide background for document review and report preparation.

Site reconnaissance (SR) trips focused on SWMUs, areas of known or suspected releases or spills, and areas where tenant activities have been conducted. Kleinfelder was accompanied by KMCC personnel during the SRs. Visual and verbal information obtained during the SR trips was recorded and used to supplement the information obtained from various documents. The SR information typically included design features, operating procedures, physical condition of the area, visual evidence of releases, and possible migration pathways. Either hand written notes or an audio dictation system was used to record the information for use during report preparation.

Major Review Factors

The five general categories of information reviewed and evaluated during the PR were:

- o Unit Characteristics;
  - type of unit
  - design features
  - past/present operating procedures
  - period of operation
  - age of unit
  - location of unit
  - physical conditions
  - method of unit closure (if closed)
- o Waste Characteristics;
  - type of waste placed in unit
  - physical and chemical characteristics
  - migration and dispersal characteristics
- o Migration Pathways;
  - geological setting
  - hydrogeological setting
  - atmospheric conditions
  - topographic characteristics
- o Evidence of Release;
  - prior inspection reports
  - citizen complaints
  - monitoring data
  - visual evidence
  - physical evidence
  - sampling data
- o Exposure Potential
  - proximity of affected population
  - proximity of sensitive environments
  - migration potential

2.3.2 Agency Actions After Review of the ECA

Visual Site Inspection (VSI)

The NDEP may conduct a VSI, if necessary, after they have reviewed the ECA Report. Any VSIs will be conducted with representatives from the NDEP, KMCC, and Kleinfelder.

Sampling Visit (SV)

The NDEP will notify KMCC if sampling will be required after they have reviewed the ECA Report.

A sampling plan will be prepared and submitted to the NDEP for review and comment if sampling is required as part of the ECA. Sampling and analyses will be conducted as required by the NDEP. The approved sampling plan will be used as a guide for the sampling process.

2.4 Limitations

The following limitations cover this report and appendices in their entirety.

The scope of work for this report is to provide a description of the environmental conditions, as of the date of the work, resulting from past and present activities at the Kerr-McGee Chemical Corporation (KMCC) Henderson, Nevada Site. The scope of this assessment was limited to a qualitative evaluation of information based on the level of effort contained in the consent agreement between KMCC and the State of Nevada, Division of Environmental Protection (NDEP) dated April 25, 1991. The information for this study was obtained from KMCC documents, documents provided by various other sources including several regulatory agencies, interviews, and visual observations made during site visits. This assessment did not include soil, surface water or groundwater sampling.

A detailed review of documentary information was completed during development of this report. This evaluation did not extend to the issue of data quality. Due to the volume of information reviewed, Kleinfelder has not made any independent evaluation of the quality of data used as a basis for this report. Because the information has been generated by different sources over various time periods, it is expected that the data quality varies. For the purposes of this report, however, Kleinfelder has assumed that all data are of equal quality unless otherwise specifically discussed. These data are presented in a narrative that has essentially been organized in the format recommended and approved by the NDEP.

This report is one of seven (7) reports subject to an Environmental Conditions Assessment (ECA) of the BMI Complex. As such, these reports should be reviewed collectively and not used singularly.

The Consent Agreement requires a thorough records review for each Company comprising the BMI Complex, and does not envision or require extensive interviews of current or former employees. As such, those interviews conducted with current employees, were to supplement, with personal knowledge, the facts and circumstances illuminated by the records. Therefore, as a document based almost entirely on the review of historical and public records, this report does not and cannot be represented to contain all potentially relevant information, nor can it be said with certainty that all facts, figures or data presented in this report will, upon future review or scrutiny, be determined to be correct, whether due to error or subsequently discovered information.

KMCC and Kleinfelder conclude that this report represents their best efforts under the circumstances, and taken as a whole, represents the most extensive presentation of information ever assembled regarding the KMCC Henderson, Nevada facility. Moreover, (and recognizing the limitations of this ECA as set forth above) KMCC and Kleinfelder have no current actual knowledge of what may later constitute material misstatements or omissions in this document. Based on the foregoing, KMCC and Kleinfelder reserves the right to subsequently dispute or correct any description, data, or other information presented in this report.

Also, it must be recognized that this report has been prepared for purposes of facilitating the NDEPs assessment of environmental conditions relating to the KMCC site. In preparing this report, KMCC and Kleinfelder interpreted or analyzed information which was often unclear, inconsistent, or incomplete in favor of promoting the public health and environmental quality objectives of the NDEP. Accordingly, this report should be considered in light of these objectives and should not be utilized for any purposes or in other contexts other than the purposes and context for which it was prepared.

Kleinfelder performed this assessment in accordance with generally accepted professional standards of care that existed at the time of this study, in accordance with the current regulatory framework, and in accordance with a work plan dated June 28, 1991 which was reviewed and approved by KMCC and NDEP. Professional judgments leading to any conclusions or recommendations were made based upon the information of source documents provided to us, interviews, and limited site reconnaissance. Kleinfelder does not warrant the accuracy of any of the documents or information on which this report is based.

3.0 FACILITY BACKGROUND INFORMATION

3.1 Site History and Overview

3.1.1 General

The Kerr-McGee Chemical Corporation (KMCC) Site is part of the Basic Management Incorporated (BMI) complex. The BMI complex is located in an unincorporated portion of Clark County, Nevada and is completely surrounded by the City of Henderson, Nevada. Originally sited and operated by the United States Government as a magnesium production facility, the BMI complex operated from August 31, 1942 until November 15, 1944 to support the war effort. A portion of the complex was then leased from the U.S. Government by Western Electrochemical Company (WECCO) in 1945. By August 1, 1952, WECCO had purchased various portions of the complex. In 1955, WECCO merged with American Potash and Chemical Company (AP & CC) who operated the site through 1967. In 1962, AP & CC purchased the current ammonium perchlorate plant, sodium perchlorate plant, and 1/2 of the sodium chlorate plant from the U.S. Government. KMCC purchased AP & CC in 1967 and gained control of the property. Table 3.1.1 lists the previous operating entities at the KMCC site (Reference K037, K170, UL001, K262). An operating entity, as used herein, applies to anyone who controlled any portion that now comprises KMCC's segment of the BMI complex. This term is used to distinguish these entities from lessees and tenants.

TABLE 3.1.1

LIST OF PREVIOUS OPERATING ENTITIES AT KMCC SITE

Entity	Operating Years
U.S. Government	1941 to 1962*
WECCO	1945 to 1955
AP & CC	1955 to 1967
KMCC	1967 to Present

(Reference K037, UL001)

Note*: Portions of the U.S. Government operations were transferred to WECCO in 1945 but did not include the aforementioned ammonium perchlorate, sodium perchlorate, and 1/2 of the sodium chlorate plants. These areas were transferred later to AP & CC in 1962.

The original BMI complex was developed for the purpose of producing metallic magnesium for use by the military in World War II. The Defense Plant Corporation (DPC), acting for the U. S. Government, signed a contract with Basic Magnesium Incorporated on July 5, 1941 to construct and operate a magnesium plant. A site was selected between Las Vegas, Nevada and Boulder Dam since the plant needed considerable amounts of power and water (Reference N011). Additionally, this site was selected because a large magnesium ore deposit was within a reasonable distance and an ample supply of salt was procurable at an economical cost (Reference UL013).

Ground breaking for the magnesium plant began on September 15, 1941. On August 31, 1942, the switch was closed placing into operation the first set of electrolytic cells. Six weeks later, the first magnesium ingots were shipped to defense plants in Los Angeles, California for production of airplane parts. Later shipments were sent to airplane factories throughout the United States. All shipments of magnesium ingots occurred by rail and by the time the plant closed on November 15, 1944, roughly 166,322,700 pounds of marketable, refined, or alloyed magnesium ingots had been produced (Reference UL001).

The last production unit (Unit 10) was completed on May 14, 1943. On July 31, 1943, the last switch was closed placing into operation the tenth set of electrolytic cells. On November 15, 1944, the magnesium production portion of the plant was closed after 807 days of continuous operation. However, the supporting electrolytic chlorine and caustic soda portions of the plant remained in operation and in May 1945 were leased to Stauffer Chemical Corporation (Reference UL001, N011).

After the magnesium plant closed on November 15, 1944, the Reconstruction Finance Corporation (RFC) assumed control of the plant from the DPC. The RFC attempted to lease portions of the plant to various tenants. During this time, lease arrangements were made with several companies including Stauffer Chemical Corporation and WECCO. In October 1946, the RFC relinquished custody of the plant to the War Assets Administration (WAA) for liquidation (Reference N011, UL001).

During the next few years, several initiatives were taken to save the plant as a permanent industrial site. On March 27, 1947, the Governor of Nevada signed a bill authorizing the Colorado River Commission (CRC) to act on behalf of the State of

Nevada and negotiate with the U.S. government for purchase of the plant. A letter of intent dated March 17, 1948 and a supplemental letter of March 19, 1948 laid the foundation for CRC's purchase of the plant from the WAA. A letter from the WAA dated March 31, 1948 indicated the purchase terms had been accepted. On June 3, 1949, the BMI holdings were transferred to the CRC (the State of Nevada) by way of a quitclaim deed (Reference N001, N011, UL001, K262).

During the time that the CRC was negotiating with the federal government, a meeting between WAA, CRC, and State of Nevada representatives was held in Henderson, Nevada to discuss management of the property. An agreement was reached to leave the facility in the possession of the State of Nevada. However, a new organization was formed to manage the properties. This organization, Basic Management, Incorporated (BMI) was formed by appointing representatives of each of the primary resident companies. By 1951, the power distribution utilities and facilities common to all the users of the plant were purchased by BMI. The ownership of the main electrical substations was retained by the federal government and are currently managed by the Western Area Power Administration (WAPA) (Reference N001, N011, UL001, "Living Map" in BMI office).

The U. S. Government site facilities which later came under control of KMCC include the following (Reference K164, N009, N011):

- six metal processing unit buildings (Units 1 through 6) and the attached chlorination buildings, rectifier buildings, motor generator buildings and bridges;
- a flux plant;
- peat storage areas;
- an area with a salt storage building, pulverizer building, tunnel kiln building, rotary kiln building, pellet storage building, and magnesite silos;
- various other buildings and open storage area; and
- an area occupied by approximately two and one-fifth of the original four "Trade Effluent" disposal ponds. These on-site ponds were used for management of liquid waste generated by the U.S. Government operations.

Some of these original facilities remain (such as units 1 through 6) and have been renovated and modernized. Other original facilities (such as the peat storage buildings) have been removed and only foundations remain. Still other original facilities (such as the flux plant) have been replaced with newer structures.

3.1.2 U.S. Government Activities

The U.S. Government operated the BMI complex for the production of magnesium metal between August 31, 1942 and November 15, 1944. Magnesium oxide was delivered to the BMI complex from Gabbs, Nevada and stored in several large silos awaiting use (Reference UL001).

The production of magnesium metal began in the proportioning plant with the mixing of raw materials in rotary mixers. The raw materials included magnesia, magnesite, peat, coal, and salts. This mixture was then fed to several pug mills where concentrated magnesium chloride solution was mixed with the dry mass to form a dough-like material. This material was then sent to the preparation building (Reference UL012).

Two similar materials were produced in the preparation plant. The dough-like material from the pug mills was processed and dried to form either pellets or blocks for feed to the chlorinators. This process included the use of a tunnel kiln and rotary kilns (Reference UL012).

The magnesium process occurred in ten large identical buildings (Units 1 through 10). Each unit included a chlorination building, electrolytic cell building, rectifier building, motor generator building, and bridges that connected the units. The pelletized and chunked material formed at the preparation plant was transported to the metal units. The pellets were then charged to chlorinators (furnaces) where they were reacted with chlorine gas at 850^{O}C to form anhydrous magnesium chloride. The molten anhydrous magnesium chloride was collected from the bottom of the chlorinator and fed to an electrolytic cell where unrefined magnesium metal and chlorine were produced. The chlorine was recycled to the chlorinators and the unrefined magnesium metal "cell metal" was cast into ingots (pigs) in a separate area and sent for refining (Reference N001, N009, UL001, UL012).

The impure magnesium pigs were heated, melted, and refined. The refined molten metal was then poured into molds using an automatically controlled tilting frame, crane, and furnace pot. The furnace pot was transferred to a cleaning room to empty the sludge/impurities (Reference UL012).

The concentrated magnesium chloride solution added in the pug mill to prepare the "dough" was prepared by reacting raw materials with chlorination and refining wastes. Exhaust gases from the chlorinators were scrubbed in primary and secondary wash towers. The scrubber solution contained hydrochloric acid and magnesium chloride. This solution was neutralized with calcined magnesite, concentrated by evaporation, and stored ready for use (Reference UL012).

The chlorine and caustic solutions used in the process were manufactured in a plant sited on the western portion of the BMI complex. Once the magnesium production process was well established, only make up chlorine from the plant was needed as the majority was recovered from the electrolysis in the metal units (Reference UL012).

Each of the ten "metal" units contained 88 electrolytic cells. During operation, each cell produced the following daily (Reference N009):

- 390 pounds of "cell metal";
- 96 pounds of waste cell melt;
- 70 pounds of cell mud; and
- 1,000 pounds of chlorine gas.

Acid and caustic wastes were also generated as a part of the process. Portions of both of these wastes were used in the production of concentrated magnesium chloride solution for use in the pug mill (Reference UL012). However, some quantity of acid and waste caustic liquor was discharged to evaporation ponds (Reference UL020). Initially this waste was discharged to the four on-site "Trade Effluent" disposal ponds and later to the upper and lower BMI ponds. (Reference UL020).

Detailed records describing the quantities of waste produced and the location(s) for disposal during the U.S. Government era were not found during this study. The disposal methods and location of any unrecycled waste cell melt and cell mud materials is not known. From the materials on hand, the following summary of waste management practice was pieced together:

- Liquid wastes were discharged to four "Trade Effluent" disposal ponds (two and one-fifth of which are present on KMCC property) (Reference K164). The liquid wastes were comprised of acid effluent and waste caustic liquor (Reference UL020).

- Wastewater originating from site processes was discharged to a storm sewer system which emptied into unlined drainage ditches (the Beta Ditch). The unlined drainage ditches (the Beta Ditch) routed wastewater to a system of unlined ponds currently known as the upper and lower BMI ponds (Reference K164, UL020).

- Solid materials (possibly wastes) were placed in an open area due south of the "Trade Effluent" disposal ponds and north of the caustic settling ponds. The material was placed in an area which currently is owned by KMCC, Pioneer, and BMI (Reference K164).

3.1.3 Other Previous Lessees On KMCC Property

Between November, 1944 and June, 1949 several companies leased portions of the BMI complex from either the RFC or the WAA. The actual locations leased and operations conducted by these companies are not well documented. The following descriptions are for lessees which are known to have occupied property which later became part of the KMCC site. This information is not based on title reviews or legal descriptions, but rather from a review of the cited publicly available documentation, and is included solely for the purpose of compiling information on industrial processes and wastes generated.

Valite Industries, Inc.

Valite Industries, Inc. (Valite) was listed in an April 21, 1947 Las Vegas Review-Journal article as a new lessee (Reference GL002). Valite proposed to lease the south half of the flux plant including one-half of the crusher building, one-half of the conveyor ramp, one-half of the proportioning bins, the barrel storage building, and one room in the central laboratory (Reference N008). The laboratory was located west of Unit 1 which is currently Pioneer property. The remaining leased facilities were located north of Units 5 and 6 in the current KMCC manganese leach plant area (Reference N009). Valite operation involved building materials and plastics (Reference GL002). Further documentary information that would provide more detail was not found.

Hardesty Chemical Company

Hardesty Chemical Company (Hardesty) signed a letter of intent on December 10, 1945 for a five-year lease (Reference N009). Hardesty began operations on September 1, 1946 and occupied eight buildings including Unit 2 (Reference N008, N007). By early 1948, Hardesty was purchased by AMECCO Chemicals, Inc. (Reference UL002). Hardesty (and/or AMECCO) produced synthetic detergents, various chlorinated organics, chemicals for fireproofing paints, insecticides, and chlorinated solvents (Reference UL002). Chlorobenzol was also produced (Reference N008). Products listed for proposed production included muriatic acid, synthetic hydrochloric acid, monochlorobenzene, paradichlorobenzene, orthodichlorobenzene, and DDT (Reference N008, N009). Further documentary information that would provide more production process detail was not found.

3.1.4 <u>Previous Operating Companies</u>

Western Electrochemical Company

Western Electrochemical Company (WECCO) was the first privately owned company to operate on the future KMCC site within the original BMI complex after magnesium production stopped on November 15, 1944. WECCO operated the site from approximately 1945 through 1955. During this time the original BMI was renamed Basic Management Incorporated. WECCO produced chemicals including Sodium Chlorate, Potassium Chlorate, Potassium Perchlorate, Ammonium Perchlorate, and Manganese Dioxide (Reference K037, N001).

In May, 1945 WECCO entered into a contract with the Defense Plant Corporation (DPC) for the production of perchlorates at the Henderson industrial facility. The plant was designed and operated for the Department of the Navy. One of the ten existing "Units" was rehabilitated for the production of perchlorates to support the World War II effort. The conversion involved the removal of magnesium cell lines and installation of Schumacher type chlorate and perchlorate cells along with other related equipment. By June or July 1945, the plant was operating even before the conversion was complete. However, the plant only operated for approximately one month as production was stopped the day after V-J day. A clean-up program was initiated and the equipment was placed in stand-by condition (Reference N001, N007, N011).

Six months later, WECCO negotiated a lease with Reconstruction Financing Corporation (RFC), which had dissolved DPC. WECCO resumed operations in February 1946 for the production of chlorates and perchlorates for the commercial market. The areas included in this lease comprised (Reference N001, N011):

- Unit 4;
- the salt storage area;
- the acid neutralization area; and
- miscellaneous office and storage areas.

In 1950, WECCO expanded its operations to include production of manganese dioxide. A large pilot plant was constructed in November, 1950 and placed in operation in February 1951. In May 1953, a ten ton per day plant was completed to replace the pilot plant for the production of synthetic, battery-grade electrolytic manganese dioxide. In June, 1953, WECCO started production of high purity manganese metal on a developmental basis (Reference N001).

During WECCO's tenure, the entire Basic Magnesium Project (BMP) was turned over from the RFC to the Colorado River Commission (CRC) for management and disposition. On May 20, 1952, a bill of sale recorded the purchase of portions of the BMP complex by WECCO from the CRC (Reference N001). The bill of sale included the following inventory of the property purchased by WECCO (Reference N011):

- Units 1 through 6
- the preparation area;
- the neutralization plant area;
- the flux plant area; and
- numerous various storage buildings, shops, substations, etc.

A list of products, estimated amounts produced and years of production for WECCO are summarized in Table 3.1.2.

TABLE 3.1.2

PRODUCT SUMMARY FOR WECCO

Product	Estimated Amounts Produced (tons)	Years Produced
Sodium Chlorate	33,153	1945 to 1955
Potassium Chlorate	12,599	1945 to 1955
Potassium Perchlorate	10,402	1945 to 1955
Ammonium Perchlorate	7,142	1951 to 1955
Manganese Dioxide	6,226	1951 to 1955

(Reference K037, K176, K179)

WECCO disposed an estimated 104,000 cubic feet of chlorate process wastes (i.e. graphite, calcium carbonate and calcium sulfate) in the Upper and Lower BMI ponds between 1945 and 1955 (Reference K037). WECCO also disposed perchlorate process solids in the BMI ponds during the years 1951 to 1955. Perchlorate solids were not measurable in the liquid waste streams (because they were soluble), therefore, reliable numbers for the amount of solid waste disposed to the BMI ponds are not available (Reference K037). The specific pond(s) that received these wastes (upper or lower BMI ponds) are not documented (Reference K056).

WECCO disposed an estimated 95,000 cubic feet of manganese dioxide process wastes (i.e., manganese ore, heavy metal sulfides, diatomaceous earth and paraffin wax) in the on-site "company ponds" between 1951 and 1955 (Reference K037). The term on-site "company ponds" refers to the leach beds located beneath the current manganese tailings pile area. Table 3.1.3 provides a summary of the waste information for WECCO.

TABLE 3.1.3

SUMMARY OF WASTE INFORMATION FOR WECCO

Process Waste	Years	Volume cu. ft.	Disposal Site
Chlorates	1945-1955	104,000	BMI Ponds
Manganese Dioxide	1951-1955	95,000	Company Ponds(1)
Perchlorate Solids	1951-1955	Not Measurable	BMI Ponds

(Reference K037)

(1)Company Ponds refers to leach beds on the KMCC site.

American Potash and Chemical Corporation

American Potash and Chemical Corporation (AP & CC) operated the site from 1955 to 1967 (Reference K037). AP & CC acquired the site in 1955 through a merger agreement with WECCO (Reference K262). AP & CC produced similar chemicals and wastes to those produced by WECCO (Reference K037). Production accounting procedures use 1955 as the end date of WECCO production and 1956 as the start of AP&CC production. Table 3.1.4 provides a summary of the chemicals produced and Table 3.1.5 provides a summary of the waste produced by AP & CC.

TABLE 3.1.4

PRODUCT SUMMARY FOR AP & CC

Product	Estimated Amount Produced (tons)	Years Produced
Sodium Chlorate	149,419	1956 to 1967
Potassium Chlorate	23,046	1956 to 1967
Potassium Perchlorate	3,142	1956 to 1967
Ammonium Perchlorate	83,240	1956 to 1967
Manganese Dioxide	41,432	1956 to 1967

(Reference K037, K176)

AP & CC disposed an estimated 162,000 cubic feet of chlorate process wastes in the BMI ponds during the years 1956 to 1967 (Reference K037). AP & CC also disposed perchlorate process solids in the BMI ponds during the years 1956 to 1967. Perchlorate solids were not measurable in the liquid waste streams (because they were soluble), therefore, reliable numbers for the amount of solid waste disposed to the BMI ponds are not available (Reference K037). The specific pond(s) that received these wastes (upper or lower BMI ponds) are not documented (Reference K056).

AP & CC disposed an estimated 426,000 cubic feet of manganese dioxide process wastes in the on-site "company ponds" during the years 1956 to 1967 (Reference K037).

TABLE 3.1.5

SUMMARY OF WASTE INFORMATION FOR AP & CC

Process Waste	Years	Volume Cu.Ft.	Disposal Site
Chlorates	1956 - 1967	162,000	BMI Ponds
Manganese Dioxide	1956 - 1967	426,000	Company Ponds(1)
Perchlorate Solids	1956 - 1967	Not Measurable	BMI Ponds

(Reference K037)

Note:
(1)Company Ponds refers to leach beds on the KMCC site.

3.1.5 Kerr-McGee Chemical Corporation Activities

Kerr-McGee Chemical Corporation (KMCC) is the current site owner/operator and obtained the facility from AP & CC in 1967 through a merger. Plate 3-1 depicts the current KMCC property boundary (Reference "Living Map" in BMI office).

KMCC has produced a variety of products at the Henderson, Nevada facility since 1967. Besides manufacturing the same chemical products that WECCO and AP & CC produced at the facility, KMCC introduced the following six new chemical products to their production processes: sodium perchlorate, magnesium perchlorate, boron

trichloride, boron tribromide, elemental boron, and a sodium chlorate based bleaching agent called Tumbleaf Defoliant®. Sodium perchlorate was produced by WECCO and AP&CC, as an intermediate product, whereas KMCC marketed this product commercially. Table 3.1.6 lists these products, estimated amounts produced, and years of production.

TABLE 3.1.6

PRODUCTS, ESTIMATED AMOUNTS, AND YEARS PRODUCED AT THE KMCC FACILITY

Product(1)	Estimated Amounts Produced (tons)	Years Produced(2)
Sodium Chlorate	374,066	1967 to current
Sodium Perchlorate	14,819	1968 to current
Potassium Chlorate	5,103	1967 to 1975
Potassium Perchlorate	8,762	1967 to 1982
Ammonium Perchlorate	214,776	1967 to current
Manganese Dioxide	219,470	1967 to current
Magnesium Perchlorate	744	1969 to 1976
Boron Trichloride	4,346	1973 to current
Boron Tribromide	62	1973 to current
Elemental Boron	112	1972 to current
Tumbleaf Defoliant® (Reference K037, K095, K176)	3,798	1975 to 1985

Notes:

(1) Other inorganic chemicals were also produced at various times for a limited time period on an experimental basis (Reference K037). These included bench or pilot tests which produced small quantities of chemicals similar to those used or produced at the facility.

(2) Current indicates the time this report was being prepared; fall of 1991.

Descriptions of KMCC's chemical processes, waste streams and waste management practices for the above listed products are provided in Sections 4.0 through 7.0 of this report.

Production and recovery of chlorates (sodium chlorate and potassium chlorate) has occurred historically in Units 3, 4, and 5 (Reference Plate 3-2). The sodium chlorate

process was renovated in 1989 and the new process began production in January 1990. The new electrolytic and recovery processes occur solely in Unit 3 (Reference Sections 4.1 and 4.2 of this report).

The production of perchlorates (excluding ammonium perchlorate) has occurred historically in Units 4 and 5 (Reference Plate 3-2). Currently, sodium perchlorate is produced within the eastern portion of Unit 5 (Reference Section 4.4, 4.5, and 4.6 of this report).

Production of ammonium perchlorate (AP) on-site was initiated by WECCO in 1951. The AP process occurs in several buildings located in the central portion of the facility (Reference Plate 3-2; Section 4.7 of this report).

The benefication of manganese dioxide ore to produce high purity, battery active manganese dioxide occurs on-site in two areas. The ore is prepared and leached in the Manganese Dioxide Leach Plant area north of Units 5 and 6. The resulting manganese sulfate solution is fed to electrolytic cells in Unit 6 (Reference Plate 3-2; Sections 4.8 and 4.9 of this report).

Production of boron products was initiated by KMCC in 1972. Elemental boron, boron trichloride, and boron tribromide are produced in Unit 5 (Reference Plate 3-2; Sections 4.10, 4.11, and 4.12 of this report).

Tables 3.1.7 (below) and C-1 (Appendix C) provide summaries of waste information for KMCC and this facility.

TABLE 3.1.7

SUMMARY OF WASTE INFORMATION FOR KMCC

Waste	Years Produced	Disposal Site
Chlorate Wastes	1968 to 1974	BMI Ponds
Perchlorate Wastes	1967 to 1974	BMI Ponds
Liquid Wastes	1968 to 1976	BMI Ponds
Elemental Boron Wastes	1972 to 1976	BMI Ponds
Perchlorate Wastes	1975 to Present	Lined Ponds(1)
Liquid Wastes	1975 to Present	Lined Ponds(1)
Elemental Boron Wastes	1976 to Present	Lined Ponds(1)
Chlorate Wastes	1975 to 1980	BMI Dump
Boron Compounds Wastes	1972 to 1979	BMI Dump
Boron Compounds Wastes	1979 to Present	Sanitary Landfill(2)
Chlorate Wastes	1980 to 1983	On-Site H.W. Landfill(3)
Chlorate Wastes	1983 to Present	Commercial H.W. Landfill(4)
Manganese Dioxide Wastes	1967 to 1975	On-Site Leachbeds
Manganese Dioxide Wastes	1975 to Present	On-Site Nonhazardous Pile

Notes:

(1) Lined ponds are the single- and double lined surface impoundments constructed on the KMCC site.

(2) Sanitary Landfill refers to the sanitary landfill operated by Silver State Disposal Company. Material disposed is nonhazardous solid industrial waste.

(3) On-site H.W. Landfill refers to the hazardous waste landfill located on the KMCC site. This landfill was closed in accordance with applicable regulations.

(4) Commercial H.W. Landfill refers to the hazardous waste landfill in Beatty, Nevada currently operated by U.S. Ecology, Inc.

(Reference K037, K039, K095)

In January 1976, KMCC achieved "zero discharge" status for industrial wastewater (Reference K347). From 1971 to 1976, KMCC achieved this zero discharge status by altering operations and constructing lined ponds (surface impoundments) on their site for recycle and evaporation.

Between 1971 and 1976, while working towards achieving "zero discharge" status, KMCC undertook several steps including the following:

- modification of the manganese dioxide process in 1975 through installation of filters to provide a semi-dry filter cake waste to replace the former sluiced (slurried) waste (Reference K003, K013, UE030);
- modification of the sodium chlorate process in 1975 through installation of additional filters to provide a semi-dry filter cake waste to replace the former sluiced (slurried) waste (Reference K003, K013, UE030);
- modification of the ammonium perchlorate process. The process modifications were completed by May 1, 1974 (Reference K003, K013, UE030);
- construction of on-site lined surface impoundments (SIs) for management of chlorate process liquids and ammonium perchlorate (AP) process liquids. SI S-1 was completed in October 1974 for management of chlorate process liquids. Three AP SIs were completed by May 8, 1974 for management of AP liquids (Reference K003, K013, UE030); and
- construction of on-site lined SIs for management of various process liquids and wastes. SI C-1 was completed by December 1974 for management of nonhazardous wastes including cooling tower liquids. SIs P-1 and P-2 were constructed in May through September 1972 for management of potassium bearing process fluids (Reference K003, K013, UE030).

Additional modifications to both process and waste management practices continue through the present time. These modifications include closure of outdated SIs, construction of several on-site lined process specific SIs, and initiation of procedures to reduce potential environmental impacts.

3.2 Site and Geologic Conditions

3.2.1 Location and Climate

Location

The BMI complex (excluding the upper and lower BMI ponds) is surrounded by the community of Henderson, Nevada. The KMCC site is located within the central portion of the BMI complex. Henderson, and the facility, are built upon an alluvial fan approximately mid distance between Boulder Dam and downtown Las Vegas, Nevada. Las Vegas, Nevada is approximately 10 miles northwest of the BMI complex.

Climate

The Las Vegas Valley climate is arid to semi-arid. This area is one of the driest and warmest areas in the United States. The climate consists of hot summers, mild winters, a moderately wide diurnal temperature range, and wide fluctuations in seasonal rainfall. Cloudless skies are normal (Reference UB003, K170).

The Las Vegas Valley receives an average annual precipitation of 4.62 inches. Precipitation generally occurs during two clearly defined rainy seasons. During the winter months (December through March) cyclonic storms usually release the most rainfall. These frontal storms produce low intensity rainfall over large areas. Some frontal storms also occur during the summer, but most rainfall during the summer and early fall results from violent thundershowers which form quickly and deliver their rain in sudden showers, causing occasional local floods and erosion. Over one-third of the annual average rainfall at Las Vegas' McCarran Airport (2,162 feet elevation) occurs as short term, high intensity rainfall during these violent thunderstorms. Most documented floods in Las Vegas occur during July and August (Reference K167, OT002).

Temperatures occasionally rise to 120° F in the lower valleys in summer, but may fall below 20° F on the higher mountains in winter. The mean daily maximum temperature at Las Vegas' McCarran Airport ranges from 55.4° F in January to 113° F in July. The mean daily minimum temperature for the same months ranges from 32.9° F to 76.1° F. (Reference K167, OT004).

The "potential annual evaporation" from lake and reservoir surfaces ranges from 60 to 82 inches, or roughly 15 to 20 times the annual precipitation (Reference K167). The high evaporation is the result of high annual temperatures, low precipitation, frequent wind, and commonly low humidity (Reference UB003, K170).

The average relative humidity is approximately 20 percent. Less than 10 percent relative humidity is common during the summer months (Reference UB003).

Winds frequently blow from the southwest or northwest and are strongly influenced by the mountain topography. The mean wind velocity is 9 miles per hour (mph), but

velocities in excess of 50 mph are experienced several times a year during the passage of major frontal systems. During high winds, ground surface material becomes airborne, and the blowing dust and sand may travel many miles (Reference UB003).

3.2.2 Regional Geology

The Las Vegas Valley is a prominent topographic depression trending northwest and extending approximately 55 miles from Railroad Pass to near Indian Springs. Frenchman Mountain and Sunrise Mountain bound the Valley to the east. The Las Vegas Range, Sheep Range and Desert Range bound the Valley to the north. The Spring Mountains bound the Valley to the west and the McCullough Range and River Mountains bound the Valley to the south and southeast respectively. The mountains/mountain ranges bounding the east, north and west sides of the Valley consist primarily of Paleozoic and Mesozoic sedimentary rocks (limestones, sandstones, siltstones, and fanglomerates). The mountains on the south and southeast side of the Valley consist primarily of Tertiary volcanic rocks (basalts, rhyolites, andesites and related rocks) that lie directly on Precambrian metamorphic and granitic rocks (Reference OT003).

The Las Vegas Valley is filled with Quaternary and Tertiary aged unconsolidated deposits. The valley floor consists of alluvial and playa deposits surrounded by more steeply sloping alluvial aprons derived from erosion of the surrounding mountains. Generally, the deposits grade finer with increasing distance from the source area and with decreasing elevation. The alluvial and playa deposits can be several hundred feet thick in several areas within the Las Vegas Valley (Reference OT001).

The structure within the Quaternary and Tertiary aged basin fill is characterized by a series of generally north-south trending step-like topographic features known as "compaction faults" [faulting attributed to differential compaction of deposits (i.e. a process in which highly compressible fine-grained deposits consolidate, or compact, to a greater degree than less compressible coarse-grained deposits)] (Reference OT003).

3.2.3 Regional Hydrogeology

Historically, nearly all of the groundwater supply in the Las Vegas Valley has come from the "Valley-fill Groundwater Reservoir". The reservoir consists of the Muddy

Creek Formation and all of the relatively unconsolidated deposits that comprise the valley fill (Reference OT003).

The aquifer system was originally subdivided into two major components by Maxey and Jameson (1948): (1) the near-surface aquifer and (2) the confined water aquifer (Reference OT003). The confined water was further divided into three zones - shallow, middle, and deep. The confined water aquifer, as defined by Maxey and Jameson, is recognizable only in the central part of the Basin and does not allow for correlation to other parts of the Basin. Harrill therefore, prefers to use the terms: (1) "Near-Surface" reservoir and (2) "Principal Aquifers", where the "Principal Aquifers" includes the original subdivisions by Maxey and Jameson as well as other recognized zones (Reference K167).

The Near-Surface Reservoir (Maxey and Jameson's Near-Surface Aquifer) is the first water encountered upon drilling. It occurs under both unconfined (water table) and confined (artesian) conditions. Under natural pre-pumping conditions, the water in this reservoir was derived mostly from upward leakage from the primary artesian system. Infiltration of sanitation process, industrial process, and irrigation waters have now become the main source of recharge to the near-surface reservoir. Discharge is almost entirely through evapo-transpiration (Reference OT003).

The principal aquifers underlie the near-surface reservoir and have confined and semi-confined groundwater conditions. In the central portions of the Las Vegas Valley, the Principal Aquifers can be subdivided into Maxey and Jameson's three zones: (1) Shallow Zone; (2) Middle Zone; and (3) Deep Zone (Reference OT003).

The shallow zone is entered immediately below the Near-Surface Reservoir at depths of as much as 300 feet, and it is underlain by the "blue-clay horizon" (Reference OT003).

The middle zone lies between the blue-clay horizon and the base of the Plio-Pleistocene (Tertiary-Quaternary) basin fill sequence. Together, with the shallow zone, these two zones are the main sources of groundwater within the Las Vegas Valley (Reference OT003).

The deep zone (believed to be in the Muddy Creek Formation) lies between 700 and 1000 feet below ground surface. Throughout most of the basin, this zone does not

readily yield groundwater due to low transmissivity values. However, a few deep wells have tapped gravelly horizons and as a result, the zone has been termed the Deep Zone (Reference OT003).

Aquifers in the Las Vegas Valley are separated by thick sequences of fine grained deposits which exhibit a low permeability. Interconnection between these aquifers in the valley occurs through upward leakage along fault zones and through semi-confining layers (Reference K167).

Recharge to the Near-Surface Reservoir (aquifer) is generally through over irrigation and other forms of artificial water use to the land surface as well as "upward leakage" through fault zones and semi-confining layers (Reference OT003).

Recharge to the Principal Reservoirs (Aquifers) is primarily through the artesian flow system and run-off from precipitation occurring in the surrounding mountains which infiltrates the alluvium along the valley margins. Locally some secondary recharge may be derived from downward percolation of excess surface water (Reference OT003, K167).

3.2.4 Site-Specific Geologic, Hydrogeologic, Topographic and Drainage Conditions

Geology of the KMCC Site

The KMCC facility rests on alluvial sediments derived from erosion of the McCullough range that form northwest sloping coalescing alluvial fans. The site specific geological conditions of the KMCC site are similar to the regional geologic conditions (Reference K170). The geologic units include the upper 200 feet of the Muddy Creek formation and overlying alluvial fan sediments (Reference K167, K170).

The Pleistocene Muddy Creek formation underlies the surficial alluvial deposits at the KMCC site. This formation primarily consists of brown to reddish-brown silty clay and clayey silt. In addition, thin discontinuous lenses of fine sand and silt may be present locally (Reference K170, K167).

The alluvial fan sediments were deposited on the older erosional surface of the Muddy Creek formation during infrequent flood runoff periods. The thickness of these

deposits varies locally depending upon the erosional configuration of the Muddy Creek surface. Generally, these alluvial deposits thicken from south to north beneath the facility. These deposits are thickest over the erosional channels and thinnest over intervening interfluvial areas. The thickness of the alluvial deposits range from approximately 19 to 62 feet beneath the KMCC facility (Reference K167, K170).

The lithology of alluvial deposits consists primarily of a reddish-brown, heterogeneous, poorly-sorted mixture of sand and gravel with lesser amounts of silt and clay. Boulders and cobbles are common. Due to their mode of deposition, no distinct beds or units are continuous over the area. Distinct layers are only present in the form of gravel beds cemented with caliche (calcium carbonate) in the northwest corner of the site (Reference K170).

A major feature of these alluvial deposits is the stream deposited sands and gravels that were laid down within the old channels developed on the surface of the Muddy Creek formation. These deposits conform to the old channel boundaries which were characteristically linear and narrow in configuration. These "channel fill" deposits are typically uniform sands and gravels and show higher permeability than the adjacent poorly-sorted alluvial deposits. Once the old erosional channels were filled with the "channel fill" deposits, they were encased by the poorly sorted alluvial fan deposits. The importance of these "channel fill" deposits is that they greatly affect and control the occurrence and movement of groundwater in this portion of the Las Vegas Valley (Reference K167, K170).

A distinct formation change between the Muddy Creek formation and alluvial sediments does not exist. A 5-foot thick transitional zone typically occurs above the Muddy Creek formation where small white clayey silt lenses are interbedded with sand and gravel (Reference K167, K170).

Hydrogeology of the KMCC Site

The following subsection is a summary of information presented in Kerr-McGee's hydrogeological investigation of 1985 (Reference K167).

The site is located near the southern edge of the Las Vegas Valley. Geologic units important to the site include the upper portions of the Muddy Creek formation and the

overlying alluvial fan deposits. These geologic units comprise the Near-Surface Aquifer. The deep Principal Aquifer is several hundreds of feet deep and is separated from the Near-Surface Aquifer by fine grained deposits of low permeability. Therefore, the potential impact to the deep Principal Aquifer by near surface discharges is unlikely. As a result, the hydrogeology of the deep Principal Aquifer is not discussed within this report. The following is a summary of the hydrogeological environments of the two geologic units of the Near-Surface Aquifer, the alluvial fan deposits and the upper portions of the Muddy Creek formation.

Alluvial fan deposits are present over the entire site and unconformably overlie the Muddy Creek Formation. The alluvial fan deposits are unsaturated (do not contain groundwater) in the southern and west-central portion of the site. In this area, the unconfined groundwater lies within the Muddy Creek Formation. Conversely, the alluvial fan deposits are saturated in the northern and east-central portion of the site.

Generally, the larger zones of saturation occur over buried "channel fill" deposits developed on top of the Muddy Creek Formation. The smaller zones of saturation occur over the interfluvial areas that separate these old channel systems. Typically, these "channel fill" deposits (which are found in the old buried stream channels developed on top of the Muddy Creek Formation) are much more permeable than the deposits in the interfluvial areas that separate the buried channel systems.

Groundwater within the Near-Surface Aquifer (alluvial fan deposits) generally exists beneath the northern and east-central portions of the site at depths ranging between less than 5 feet below ground surface (near the northeast corner of the site) to approximately 35 feet below ground surface (near the southern and west-central portions of the site).

The on-site groundwater velocity of the alluvial fan deposits was calculated to be between 0.5 and 16 feet/day. A groundwater velocity of 16 feet/day occurred within the "channel fill" deposits. The lowest groundwater velocity of 0.5 feet/day was from an interfluvial area.

The transmissivity of the on-site alluvial deposits ranged from 231 gallons per day per foot (gpd/ft) in an interfluvial area to 23,786 gpd/ft in "channel fill" deposits.

The hydraulic conductivity varied from 50 gpd/ft^2 to 1,496 gpd/ft^2 in interfluvial and "channel fill" deposits respectively. The storage coefficient averages 0.053.

Because of the variability in alluvial fan deposition and saturated thickness of the alluvial deposits, no specific or average permeability has been used to describe the on-site groundwater flow in these deposits.

Water table fluctuations are noted in several wells completed within the alluvial deposits at the site. Maximum water level fluctuations in any one well from the period June, 1983 to June, 1985 varied from 1.54 to 3.08 feet and averaged 2.16 feet. These groundwater fluctuations are the result of seasonal climatic changes with groundwater at its lowest level during the spring months and at its highest level during the fall.

Groundwater occurs within the upper portions of the Muddy Creek Formation (Near-Surface Aquifer). Groundwater is typically found within the Muddy Creek silts and clays over the west-central portions of the site at depths ranging between 35 and 55 feet below ground surface. In general, groundwater moves in a north-northwesterly direction beneath the site and changes to a north-northeasterly direction, toward the Las Vegas Wash, near the northern end of the site.

An average flow velocity of 0.53 feet/day was calculated for groundwater flowing through the Muddy Creek Formation. The relatively high value was attributed to thin sand and silt stringers which account for most of the Muddy Creek's permeability.

Transmissivity values in the Muddy Creek Formation varied from 45.2 to 180 gpd/ft and averaged 89.2 gpd/ft.

Permeability tests at four on-site wells completed in the Muddy Creek formation indicate that the Muddy Creek formation has a horizontal permeability or hydraulic conductivity ranging from 6.5 gpd/ft^2 to 54.5 gpd/ft^2 with an average of 29.1 gpd/ft^2. The average hydraulic gradient over areas where the groundwater occurs within the Muddy Creek formation is 0.027 feet/foot. The average storage coefficient was 0.053.

Water level data collected between June, 1983 to June, 1985 from selected wells within the Muddy Creek formation show small groundwater fluctuations ranging between 1.2 and 1.68 feet and appear to be a result of seasonal climatic changes. The groundwater is typically at its lowest levels during the spring months and at its highest levels during early to late fall.

Topography of the KMCC site

The KMCC Henderson Facility is located at the south-eastern edge of the Las Vegas Valley. The facility rests upon alluvial fan sediments originating from Black Mountain within the McCullough Range located south of the site. This alluvial fan slopes gradually to the north-northwest beneath the site. (Reference K167).

Topographic features of the site and site area are shown on Plates 3-1 and 3-2. The elevation ranges from approximately 1,875 feet above mean sea level (msl) in the southeastern portion of the site to approximately 1,675 feet msl in the northeastern portion of the site (Reference K161, K167).

The topography varies gradually throughout the majority of the southern and northern portions of the site. The central portion of the facility displays the most significant topographic changes. These changes are primarily associated with man-made features including drainages, surface impoundments, dikes, and the manganese tailings pile (Reference K161, SR, August 19 & 20, 1991).

Stormwater Drainage of the KMCC Site

Stormwater drainage of the KMCC site is accomplished by natural and manmade features. The manmade features include various subsurface drains and surface ditches.

Stormwater drainage from the KMCC site is accomplished by two primary drainage ditches. The Beta Ditch crosses the central portion of the site and flows to the east onto Timet property. The second unnamed drainage originates near the Beta Ditch and crosses the northern portion of the site (Reference K164, K167).

The Beta Ditch is more fully described in Sections 5.20 of this report. Historically, the Beta Ditch received flows from the storm sewer system (including process effluent) and

acid drain system. After approximately January 1976, when KMCC became a "zero industrial wastewater discharge" facility, subsequent flows to the Beta Ditch were routinely from stormwater and once through cooling water.

The unnamed drainage, mentioned above, historically lead to the Las Vegas Wash (Reference K164). Prior to 1971, some wastes may have been transmitted through this drainage, however, this drainage was designed for stormwater management. By 1979, this drainage emptied into an off-site gravel pit near the northwestern site boundary (Reference K164). This drainage currently conveys stormwater run-off (Reference K167).

Other drainage systems installed on-site by the U.S. Government during facility construction were primarily related to industrial and sanitary waste management. These systems included (Reference UL020):

- o sanitary sewer;
- o storm sewer;
- o acid drains;
- o caustic drains;
- o absorber tower drains; and
- o recirculating drains.

The sanitary sewer services the portion of the facility which was constructed by the U.S. Government (Reference K160). The sanitary sewer drains to a sewage disposal plant currently operated by the City of Henderson. This drain system was constructed of vitrified clay sewer pipe (Reference K160)

The storm sewer system is more fully described in Section 7.3 of this report. The storm sewer system was installed to collect stormwater and convey this to the Beta Ditch (Reference K178). This system was also used by various companies between 1945 and 1975 to convey various wastes to the Beta Ditch and on to the BMI ponds.

The acid drain system is more fully described in Section 7.4 of this report. This system was originally designed to convey acid effluent to a neutralization plant (Reference K163). This system was also used by various companies between 1945 and 1975 to convey wastes to the Beta Ditch and on to the BMI ponds.

The function of the caustic drain system is not well documented. This system conveyed excess cell liquor from "cell buildings" to two caustic evaporation ponds through 8-inch cast iron pipes (Reference UL020). The location of the drain system is not known. The caustic ponds are located on property currently owned by Pioneer (Reference K178; "Living Map" in BMI office).

The absorber tower drain system was installed after the magnesium plant was operating. This system was used to remove the last traces of chlorine and hydrochloric acid from the chlorinator waste gases previously scrubbed by the primary and secondary chlorinator wash towers. Waste caustic liquor from the chlorine plant was used for this purpose. After passing through the absorber tower, this waste was conveyed through vitrified clay pipe drains to the "Trade Effluent" settling ponds at the same point where the acid drains discharged (Reference UL020).

A recirculating drain system serviced the chlorine plant and discharged to cooling tower in that portion of the complex. A second recirculating drain system serviced the rest of the facility and discharged to the main cooling tower. Cooling water from bearings and heat exchangers was conveyed through this system. The system was comprised of cast iron, steel, and vitrified clay pipe (Reference UL020).

4.0 INDUSTRIAL PROCESSES AND WASTES GENERATED

Industrial Process Overview

The industrial activities at the KMCC Henderson site are separated into three production categories:

- o chlorate/perchlorate based compounds;
- o electrolytic manganese dioxide; and
- o boron and halogenated boron products.

The following paragraphs provide a brief overview of these three categories. Details of the process flow and waste stream characterization for individual processes follow in Subsections 4.1 through 4.13. There are three types of air pollutant emission sources of a depositional nature associated with KMCC's current processes. These particulate emission sources are related to the manufacture of manganese dioxide, ammonium perchlorate, and sodium chlorate. These sources were permitted in 1962 via the CCHD/APCD permit programs and include pollution control devices.

Off-specification products from the various processes were redissolved and/or reprocessed to the maximum extent possible (Reference K357).

Chlorate/Perchlorate Based Compounds

Sodium chloride, common table salt, is dissolved in water to form a brine and is then converted to sodium chlorate in an electrolytic cell. The sodium chlorate is purified and separated from the brine solution by crystallization. The sodium chlorate is either bagged as a finished product, or employed as a precursor for the on-site production of other chlorates and perchlorates. From 1975 to 1985, sodium chlorate was also blended with dry materials and marketed as Tumbleaf Defoliant® (Reference K117, K176, K253).

The bulk of the sodium chlorate product remains at the facility and is redissolved forming the feedstock to make sodium perchlorate in another electrolytic cell circuit. Most of the sodium perchlorate is used in the production of ammonium perchlorate (Reference K117, K176, K253).

From 1945 to 1975, some sodium chlorate was reacted with potassium chloride to form potassium chlorate. The same equipment was also used to make potassium perchlorate from sodium perchlorate (Reference K176, K253).

From 1969 to 1976, some ammonium perchlorate was also reacted with magnesium carbonate to make magnesium perchlorate (Reference K176, K255). These perchlorates were crystallized and sold as a solid.

Electrolytic Manganese Dioxide

This operation processes manganese dioxide ore to produce a high purity manganese dioxide for use in dry cell batteries. The ore is leached to form a manganese sulfate solution which is then converted to manganese dioxide in an electrolytic cell (Reference K117, K253).

Elemental Boron and Halogenated Boron Products

Magnesium metal is oxidized with anhydrous boric acid in an argon atmosphere to produce elemental boron. Boron carbide is heated in an induction reactor in the presence of either chlorine or bromine gas to form boron trichloride or boron tribromide (Reference K117, K257, K258).

4.1 Sodium Chlorate Process

4.1.1 General Description

Sodium chlorate has been a main chemical produced at the KMCC Henderson, Nevada site. It is a precursor for the production of potassium chlorate and all the perchlorates that have been produced at the site. Sodium chlorate production was started in 1945, when approximately 1,300 Schumacher electrolytic cells were installed at the Henderson site. The facility had a maximum production rate of approximately 32,000 tons of sodium chlorate per year.

In 1989, the Schumacher cells were shut down and replaced with 24 "Krebs" electrolytic cells. The Krebs cells have a maximum production rate of approximately 14,000 tons of sodium chlorate per year (Reference K117, K253, K357).

Table 4.1.1 summarizes the sodium chlorate production from 1951 through 1990.

TABLE 4.1.1
SODIUM CHLORATE PRODUCTION - TONS
(Reference K176)

Year	$NaCl0_3$ Recovered	$NaCl0_3$ Finished
1951	16,326	7,671
1952	18,172	7,678
1953	18,545	8,574
1954	16,528	9,230
1955	18,228	12,136
1956	24,644	16,989
1957	24,346	19,141
1958	24,232	14,228
1959	27,232	13,814
1960	20,228	12,731
1961	25,597	10,776
1962	23,110	11,562
1963	20,088	6,965
1964	17,881	7,986
1965	12,938	7,003
1966	24,246	16,088
1967	24,130	13,783
1968	24,806	17,608
1969	30,366	23,438
1970	29,515	20,904
1971	29,021	24,247
1972	29,023	20,112
1973	32,074	23,726
1974	31,757	24,862
1975	29,805	24,131
1976	30,219	23,823
1977	30,538	22,382
1978	27,984	21,312
1979	27,927	18,364
1980	27,892	19,009
1981	28,305	19,162
1982	26,004	16,066
1983	21,436	10,969
1984	22,906	8,192
1985	21,665	5,849
1986	23,401	6,658
1987	22,757	6,368
1988	15,799	1,537
1989	9,112	1,016
1990	13,764	548

Note: The production amount between 1945 and 1950 is not known. "Recovered" production is the total amount produced. "Finished" production is product ready for off-site sales. The recovered product that is not "Finished" is used as feed for other processes at the Henderson facility.

The Schumacher electrolytic cells were located in Units 4 and 5. The new Krebs electrolytic cells, which started production in January, 1990, were installed in Unit 3.

The sodium chlorate recovery equipment has historically been located in Unit 3 where sodium chlorate and impurities are separated from the mother liquor; hence waste streams also originate at that point.

Because the Krebs cells required a more pure mother liquor, the recovery and purification systems were modified accordingly.

4.1.2 Raw Materials Used

The following raw materials are used in the production of sodium chlorate (Reference K037, K253, CA017):

- sodium chloride (NaCl);
- sodium dichromate ($Na_2Cr_2O_7$);
- hydrochloric acid (HCl);
- sodium hydroxide (NaOH);
- urea ($CO(NH_2)_2$);
- water;
- soda ash (Na_2CO_3);
- strontium carbonate;
- silica (anti-caking agent);
- diatomaceous earth;
- filter aid; and
- graphite (historically).

4.1.3 Production Process Flow Description

Process Description for Schumacher Cells

The chlorate process consists of the electrolytic cells, external holding tanks, chlorate

recovery system, and brine dissolving system. The electrolytic cells are fed from large brine holding tanks and the cell overflow is returned and cycled. The chemical reactions involved in the electrolysis results in the conversion of sodium chloride to sodium chlorate. A bleed stream of cell liquor is fed to the sodium chlorate recovery process. Salt-saturated mother liquor from the recovery process, hydrochloric acid (to control pH), and sodium dichromate (a necessary constituent in the electrolyte) are added to the sodium chlorate recovery process (Reference K253).

Solution is continuously bled from the electrolytic cell recirculating system to the chlorate recovery process. Figure 4.1.1 depicts the sodium chlorate recovery operation. The solution is treated with urea and caustic, and air-agitated. After preparation and treatment, the chlorate solution is pumped to recovery where sodium chloride (salt) is added to depress the solubility of sodium chlorate. Sodium chlorate is crystallized from solution by cooling (Reference K253).

The sodium chlorate crystals are centrifuged, washed, and dried. The finished product is conveyed to storage for external use, or conveyed to a dissolving tank for internal plant use in the manufacture of other chemicals, e.g. perchlorates (Reference K253).

A description of the process begins with the mother liquor from the chlorate crystallizer passing to dissolving tanks for salt addition. Water is added only to replace the amount consumed by the electrolysis reaction. From the salt dissolvers, the salt-saturated solution is pumped to the cell recirculation system with intermittent treatment made for calcium removal (Reference K253).

Before the electrolytic cell product can be sent to the chlorate recovery process, various treatments must be performed. Residual hypochlorite must be decomposed by treatment with urea and the solution made alkaline to minimize equipment corrosion throughout the recovery system. The reaction of urea with sodium hypochlorite is represented as:

$$CO(NH_2)_2 + 3\ NaOCl + 2\ NaOH \rightarrow N_2 + 3\ NaCl + Na_2CO_3 + 3\ H_2O.$$

Filter aid is added to assist removal of particulate carbon from electrode decrepitation. At certain intervals, depending on concentration, sulfate impurity is also removed by

precipitation and pressure leaf filtration. These handling operations are all done prior to pumping the cell effluent to the recovery system salt dissolvers (Reference K253).

The salt used in the sodium chlorate salt dissolving process is of high purity to greatly reduce the need for solution purification treatment (Reference K253).

The salt is conveyed from hopper cars to silo storage, from which it is fed to the salt dissolvers as needed. Three agitator vessels in series serve as the dissolving system (Reference K253).

The filtered salt saturated solution is combined in the crystallizer feed tank with a recycle slurry stream returning from the second stage crystallizer operation. The resulting solution or slurry is fed to crystallizers (Reference K253).

Crystallization of sodium chlorate takes place in two crystallizers in series flow. The crystal slurry in each stage is cooled by circulation through an external shell-and-tube heat exchanger. Cooling in the first stage heat exchanger utilizes cold mother liquor where cooling in the second stage heat exchanger is by direct ammonia expansion on the shell side of the heat exchanger. The crystals are removed by cyclones and advanced to a centrifuge for washing. The centrifuge wash water returns to the process system as make-up water (Reference K253).

The saturated salt filtration system mentioned earlier functions to remove carbon during normal cycle and solid calcium sulfate during treatment cycle. The filter cake is sluiced to a cone bottom recovery tank where the mud is washed and settled to recover chlorate. The chlorate solution and washwater is brought back into process, and the washed mud is discharged as a waste (Reference K253).

Sulfate impurity is controlled in the recovery system by reaction with calcium chloride:

$$Na_2SO_4 + CaCl_2 \rightarrow CaSO_4 + 2\ NaCl$$

After the sulfate is removed, the excess calcium must be controlled. Removal of calcium is done by precipitation of calcium carbonate through addition of soda ash, according to the reaction:

$$Ca^{++} + Na_2CO_3 \rightarrow CaCO_3 + 2Na^{+}$$

The above reaction is carried out by adding the solid soda ash and filter aid to a surge tank which is then pumped to a pressure-leaf filter where the solids are removed. The solids are discharged from the filter to a sludge tank from which the major portion of the sodium chlorate values are recovered from the sludge before it is discharged to the storm water system as filter slurry. The filtered mother liquor is returned to the salt dissolvers (Reference K253).

Very little water enters the circuit directly without being used first to recover chlorate values from the various washing operations within the production area. Only the water that is lost by electrolysis in the cells needs to be replaced (Reference K253).

The washed sodium chlorate crystals from the centrifuge are fed to a dryer. The drying of crystals is presently accomplished by flow of hot air. Exhaust dust from the dryer is passed through a wet-type dust collector (CCHD/APCD Permit Number A09506) (Reference K372). The water used to remove and dissolve the sodium chlorate dust is recycled to the crystal centrifuge (Reference K253).

Dry sodium chlorate crystals discharge from the hot end of the rotary dryer and are conveyed to storage. The finished product may be stored, conveyed directly to handling for shipment, or used directly for solution preparation for internal plant operations in the production of other chlorates or perchlorates (Reference K253).

Off-specification sodium chlorate was redissolved and returned to the production flow for reprocessing (Reference K357).

Process Description for Krebs Cell

Sodium chlorate production using Krebs electrolytic cells started in January 1990. The Krebs electrolytic cells use titanium anodes rather than sacrificial graphite anodes as were used with the Schumacher cells. Although the chemical reactions are the same, there is a change in the sequencing of the process (Reference K259, K357).

The fresh brine is combined with the mother liquor before the mother liquor is sent to the electrolytic cells. Figure 4.1.2 is a flow diagram for the Krebs electrolytic cell process.

The brine dissolving step for both the Schumacher and Krebs systems is similar but extra purification steps have been added for the Krebs system. A portion of mother liquor from the crystallizer is treated with $CaCl_2$ to generate a sulfate precipitate cake before it is used to dissolve sodium chloride. The process is reconfigured slightly allowing the brine to be filtered before it is combined with the mother liquor (Reference K357). The moist brine cake and dry sulfate cake are combined for management as a sodium chlorate filter cake.

Some of the major differences between the Schumacher and Krebs systems are in waste generation. The Krebs electrolytic cell waste does not contain graphite. Also, because most of the salt comes from the ammonium perchlorate plant, there is less impurity and, therefore, less waste generated per ton of chlorate produced.

As in the Shumaker process, off-specification sodium chlorate was redissolved and returned to the production flow for reprocessing (Reference K357).

Solutions from the sodium chlorate production process have been sent to the on-site ponds for management since early 1975 (Reference K031, K056, K117, K158A, UE030). A brief description of the ponds (surface impoundments) and associated process fluids and wastes follows.

Old P-2 Pond

This surface impoundment received three process streams from May of 1975 to April of 1990 from the sodium chlorate production process: 1) washdown water, 2) process area storm water, and 3) excess sodium chlorate solutions from process vessels containing too much liquid. These solutions consisted of sodium chlorate solution containing small amounts of hexavalent chromium (Reference K031, K037, K161, K170; SR, August 20, 1991). Old P-2 Pond is designated SWMU KMCC-010, and is discussed in Section 5.10.

P-3 Pond

From May 1978 to 1990 this surface impoundment received sodium chlorate solution containing small amounts of chromium from washdown activity in the process area,

process area storm water, and excess solution from process vessels containing too much liquid (Reference K031, K117, K158A).

New P-2 Pond

The new P-2 pond replaces the P-3 and old P-2 ponds described above. The process streams received by the New P-2 pond remained the same (Reference K158A).

4.1.4 Waste Stream Characterization

The physical characteristics of sodium chlorate production process effluent changed with the introduction of different process filters in February 1975 and the introduction of the new Krebs electrolytic cells in 1990. Therefore, the discussion of effluent is discussed for two periods; prior to 1990 and after 1990.

Waste Characteristics Prior to 1990

Sodium chlorate production process effluent from 1945 to February 1975 were generated from sluice discharging filters, process area washdown, and storm water. From February 1975 to 1990, process effluent were generated from the following steps: sparkler filter cakes, pressure leaf filter, filter aid, process washdown, and storm water (Reference K056, K117, K278, K253, UE030).

The first waste streams generated at the filters consisted of cakes containing chiefly diatomaceous earth with small amounts of carbon, Na_2CO_3, $CaSO_4$, NaCl, $NaClO_3$, $CaCO_3$, and 0.05 to 1.00 percent hexavalent chromium (Reference K037, K056, K219, K253, K278, CA017). From 1945 to 1974, these filter cake wastes were sluiced to the upper and lower BMI ponds (Reference K037, K056). Process modifications were completed by February 1975 replacing sluice discharging filters with filters that discharged a moist cake (Reference K056, UE030). Between early 1975 and February 1980, KMCC disposed of these solid wastes in the BMI landfill (Reference K037, K056). In February 1980 the BMI landfill was closed and KMCC then disposed of these wastes in an on-site hazardous waste landfill from February 1980 to January 1983 (Reference K056, K095, K108, K128, K130). The on-site hazardous waste landfill was closed in January 1983 (Reference K130, K138). From February 1983 to present, KMCC has disposed of this waste off-site in a U.S. Ecology disposal facility located in

Beatty, Nevada (Reference K095). The changes and modifications to the sodium chlorate production process reduced the quantity of waste generated, but the waste's chemical characterization remained generally unchanged until the 1990 introduction of the Krebs cell process.

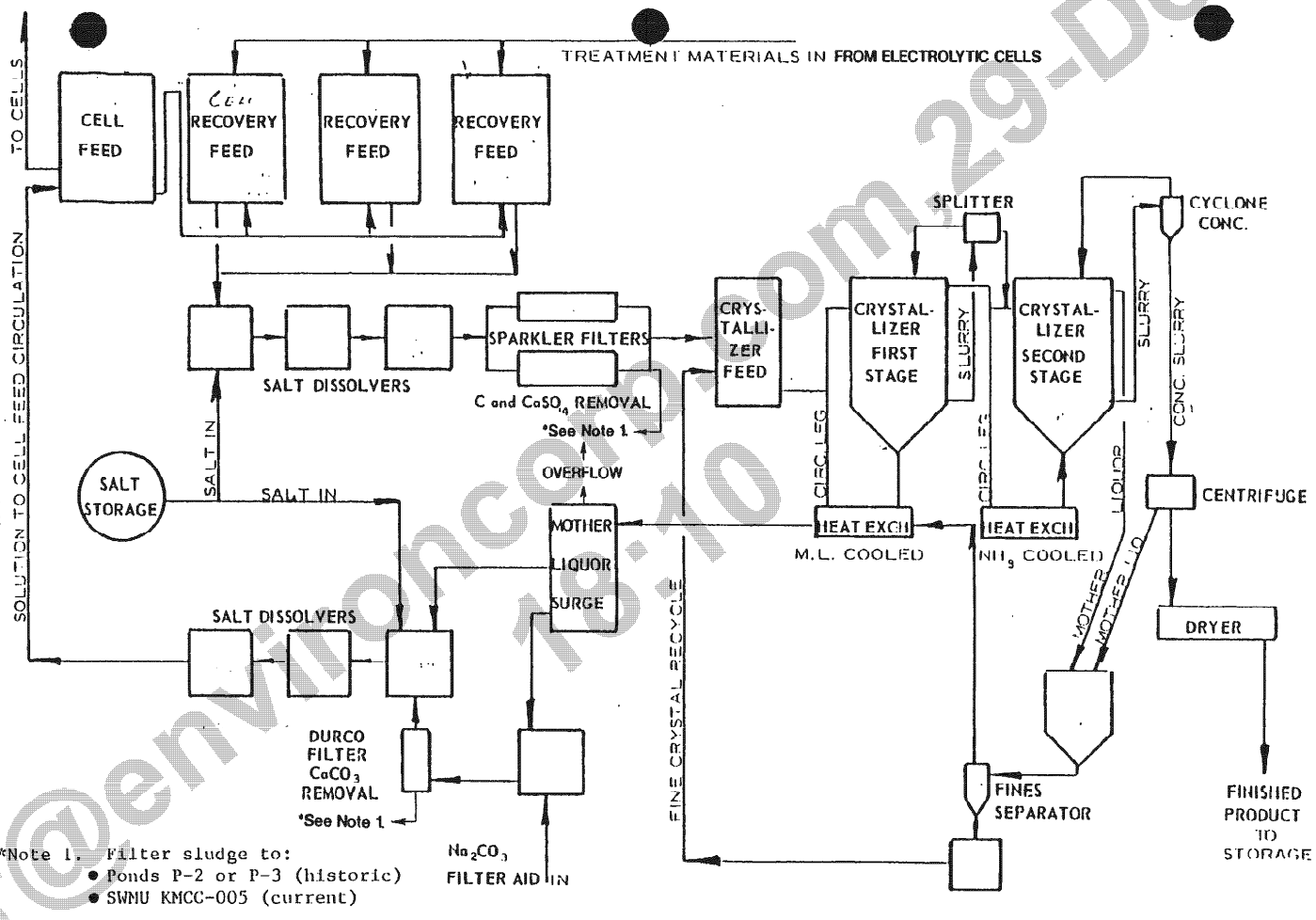
Sodium dichromate was used in the old electrolytic process and in the new Krebs cell processes. The sodium dichromate supports the reaction of converting sodium chloride to sodium chlorate. Small amounts of sodium dichromate are added to the recycle water in order to maintain a certain concentration. The brine solution is filtered after the electrolytic cell process to remove sodium chloride crystals. This filter cake stream contains some hexavalent chromium entrained with the moisture (Reference K170, K253).

Scrap carbon (graphite anodes) from the sodium chlorate process was periodically sold to off-site companies (Reference K325).

Waste Characteristics after 1990

The Krebs electrolytic process started operation in January, 1990. Waste streams from this process are generated at the following filtration operations: mud filter, brine filter, polishing filter, and sulfate filter (Reference K259, K357).

The solids (cakes or muds) resulting from these process filtration steps are dewatered at SWMU KMCC-005 prior to storage at SWMU KMCC-006. These wastes consist chiefly of diatomaceous earth and containing small amounts of sodium chlorate, sodium carbonate, calcium sulfate, sodium chloride, hexavalent chromium and calcium carbonate, and (Reference K037, K278, CA017). These wastes do not contain carbon since graphite electrodes are not used in the Krebs electrolytic cells (Reference K259). The filtrate liquid is recycled to the process and the solids are shipped off-site for disposal at a U.S. Ecology disposal facility in Beatty, Nevada (Reference K179).



*Note 1. Filter sludge to:
- Ponds P-2 or P-3 (historic)
- SWMU KMCC-005 (current)

Modified after flow diagram provided by KMCC. Reference DOC. #K253; K117, K170.

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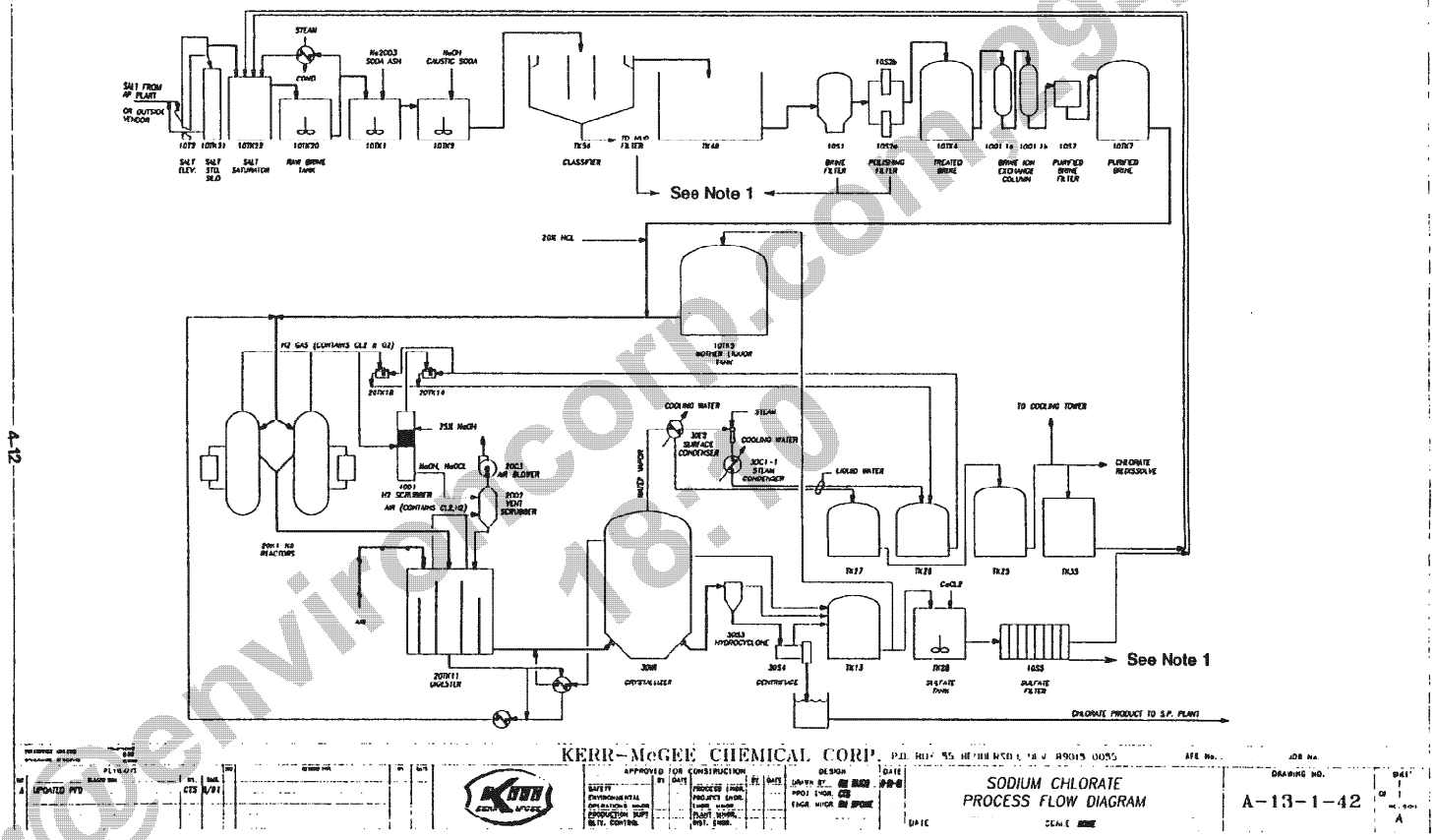


Note 1. Filter sludge to SWMU KMCC-005.

Modified after flow diagram provided by KMCC. Reference DOC #K259; personal communication KMCC Environmental Engineer.

31-135909-004

4.2 Potassium Chlorate Process (Unit 4)

4.2.1 General Description

Potassium chlorate was produced at the KMCC Henderson site between 1945 and 1975 in Unit 4. Table 4.2.1 summarizes the amount of finished potassium chlorate produced between 1951 and 1975.

TABLE 4.2.1

POTASSIUM CHLORATE PRODUCTION - TONS
(Reference K176)

Year	$KClO_3$
1951	4,498
1952	2,798
1953	2,973
1954	2,330
1955	2,198
1956	2,211
1957	1,853
1958	2,132
1959	1,846
1960	2,077
1961	2,338
1962	1,582
1963	1,439
1964	1,468
1965	2,264
1966	1,638
1967	1,624
1968	1,528
1969	861
1970	271
1971	302
1972	216
1973	154
1974	137
1975	10

Note: The production amount between 1945 and 1950 is not known.

4.2.2 Raw Materials Used

The manufacture of potassium chlorate utilized sodium chlorate produced at the KMCC Henderson facility and potassium chloride as raw materials (Reference K037, K253).

4.2.3 Production Process Flow Description

Potassium chlorate was produced by KMCC and its predecessors between 1945 and 1975 by the double decomposition of sodium chlorate and potassium chloride. The reaction employed was:

$$NaClO_3 + KCl \leftrightarrow KClO_3 + NaCl$$

The batch process is shown in Figure 4.2.1. Dry potassium chloride was mixed with water in a dissolving tank and heated. The hot potassium chloride solution was filtered and added to a crystallizer tank containing sodium chlorate solution. Crystallization of potassium chlorate occurred immediately upon mixing. The batch was cooled with ammonia cooled votators and readied for recovery (Reference K253).

Potassium chlorate crystals were recovered from a slurry on a centrifuge and washed. The centrifuge mother liquor was discharged to the storm sewer and the Beta Ditch or to on-site ponds and represented a loss of $KClO_3$, KCl, $NaClO_3$, and NaCl (Reference K253).

Crystals from the centrifuge were re-slurried and separated again on a second centrifuge. The secondary centrifuge cake was fed to a counter-current, gas-fired rotary dryer and the dried product proceeded to storage. From storage the product was ground, screened, and packed to customer specification (Reference K253).

Fines were recovered from the dryer exhaust air stream in the wet scrubber (CCHD/APCD Permit Number A09506). Water was fed to the scrubber to dissolve the fines and the resulting solution was stored for potassium chloride dissolving. Spills and recoverable solution were also stored and used for potassium chloride dissolving (Reference K253). Off-specification product is redissolved and returned to the potassium chlorate production flow for reprocessing (Reference K357).

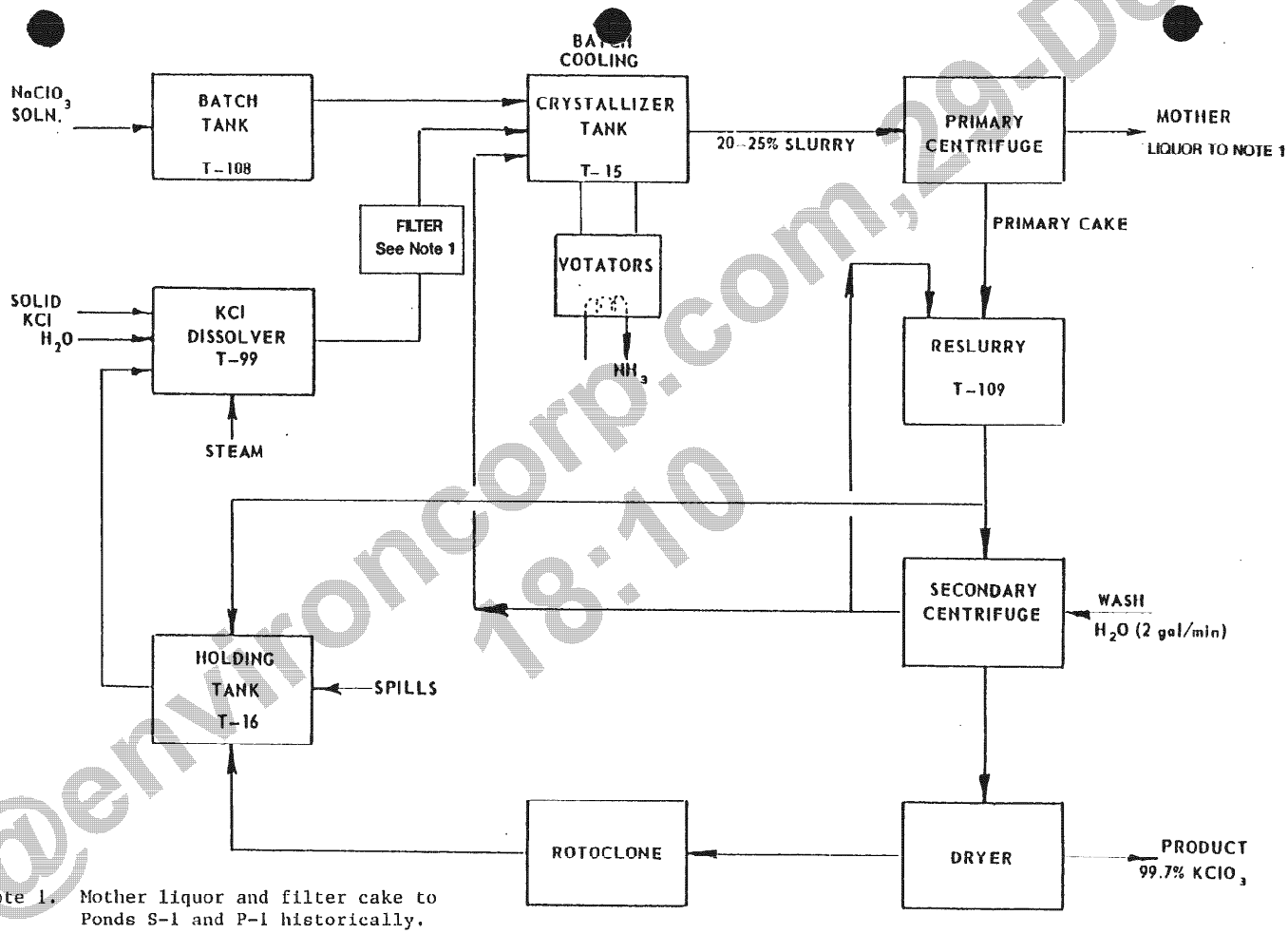
A synopsis of known on-site ponds used for management of process streams associated with the potassium chlorate production follows. For detailed discussions of these surface impoundments, refer to Section 5.0 of this report.

Lined surface impoundments S-1 and P-1 began receiving filter cake sludges and process vessel overflow solutions (occurring from upset conditions) from the time when the facility was in the process of achieving "zero industrial wastewater discharge" from 1972 to 1974 until the production of potassium chlorate ceased in 1975. Prior to the mid-1970s, these wastes were discharged to the upper or lower BMI ponds via the Beta Ditch (Reference K170, K179).

4.2.4 Waste Stream Characterization

Wastes generated from the potassium chlorate process included process solution in the form of mother liquor (extracted by a constant process bleed stream), and cake from filters. Between 1945 and 1974, this waste stream was disposed as part of the plant's wastewater which was discharged to the Beta Ditch and conveyed to the unlined BMI ponds (Reference K037, K056).

After use of the BMI ponds ceased, wastes from this process were discharged to the lined on-site S-1 or P-1 surface impoundments from 1974 to 1975 (Reference K037, K056). Waste streams from potassium chlorate production contained NaCl, KCl $NaClO_3$, and $KClO_3$ (Reference K037, K039).



Note 1. Mother liquor and filter cake to Ponds S-1 and P-1 historically.

Modified after flow diagram provided by KMCC. Reference DOC #K253.

31-135909-004

4.3 Tumbleaf Defoliant® Process (North of Unit 5)

4.3.1 General Description

Tumbleaf Defoliant® was a dry blended product that was produced at the KMCC Henderson, Nevada site between 1975 and 1985 in an area north of Unit 5 (Reference K357). This type of defoliant, typically used in the cotton industry, utilizes the bleaching action of sodium chlorate. Upon application, the sodium chlorate bleaches the leaves making them incapable of collecting sunlight thus causing the leaves to fall from the plant making harvesting of cotton easier. Table 4.3.1 summarizes production rates for Tumbleaf.

TABLE 4.3.1

TUMBLEAF PRODUCTION - TONS
(Reference K176)

Year	Tumbleaf
1975	384
1976	179
1977	290
1978	676
1979	211
1980	642
1981	523
1982	508
1983	(5)(*)
1984	248
1985	132

Note: (*) Negative number: accounting procedure to adjust finished product tonnage which is less than production figures indicate was manufactured over eight years of production.

4.3.2 Raw Materials Used

The following raw materials were used in the production of the Tumbleaf Defoliant® (Reference K256, CA017):

- Na ClO_3 (Sodium Chlorate);

- o Na_2CO_3 (Soda Ash);
- o $CO(NH_2)_2$ (Urea); and
- o Sodium Alpha Olefin Sulfonate.

4.3.3 Production Process Flow Description

All the materials used in the production of Tumbleaf Defoliant® were dry granulated or flaked solids. The material was added to a dry blender in a prescribed ratio and blended until it was homogeneous (Reference K256).

4.3.4 Waste Stream Characterization

The process apparently did not produce a waste stream (Reference CA017).

4.4 Sodium Perchlorate Process (Unit 5)

4.4.1 General Description

Sodium perchlorate production at the KMCC Henderson, Nevada site started in approximately 1945 and was conducted in the east side of Unit 5.

Sodium perchlorate has been used chiefly as a feed for the ammonium perchlorate and potassium perchlorate processes at the facility. From 1968 until 1990, sodium perchlorate was also sold as a finished product. The amount of finished sodium perchlorate produced between 1968 and 1990 is summarized in Table 4.4.1.

TABLE 4.4.1

SODIUM PERCHLORATE PRODUCTION - TONS
(Reference K176)

Year	$NaClO_4$ Finished
1968	113
1969	71
1970	375
1971	142
1972	61
1973	75
1974	62
1975	41
1976	142
1977	416
1978	333
1979	804
1980	1,383
1981	1,567
1982	942
1983	841
1984	1,366
1985	1,878
1986	1,259
1987	1,061
1988	1,346
1989	262
1990	279

Note: Sodium perchlorate produced between 1945 and 1967 was consumed in the production of ammonium perchlorate and/or potassium perchlorate.

4.4.2 Raw Materials Used

The raw materials used in the electrolytic production of sodium perchlorate include the following (Reference K253, CA017):

- sodium chlorate;
- water;
- hydrochloric acid;
- soda ash;
- cellulose filter aid;
- diatomaceous earth; and
- sodium dichromate.

4.4.3 Production Process Flow Description

The process equipment for the production of sodium perchlorate consists of electrolytic cells and external holding tanks. Figure 4.4.1 is a process block flow diagram depicting the sodium perchlorate production process. This is a batch process.

The sodium perchlorate is formed by the oxidation of sodium chlorate:

$$NaClO_3 + H_2O \xrightarrow{e} NaClO_4 + H_2$$

The anode is platinum and the electrolyte contains small quantities of sodium dichromate. The sodium dichromate is used to inhibit cathodic reduction of the chlorate or perchlorate (Reference K253).

Off-specification sodium perchlorate was redissolved and returned to the production flow for reprocessing (Reference K353).

From 1951 to prior to January 1976, some process liquids from the sodium perchlorate process were discharged to the BMI ponds via the Beta Ditch (Reference K037, K039, K056, K347). Lined SIs S-1 and P-1 were constructed between fall 1972 and spring 1974. They received these process liquids intermittently during the operation's

modification period between fall 1972 and January 1976. From January 1976 to 1983, these same process liquids were discharged to the lined on-site surface impoundments S-1 and P-1 (Reference K037, K039, K095, K124, K347). Section 5.0 of this report provides further descriptions on the S-1 and P-1 surface impoundments.

4.4.4 Waste Stream Characterization

Wastes and recyclable materials associated with the sodium perchlorate process consist of filter cakes and cell bottoms (Reference K278). The cell bottoms and filter cake material are washed to recover perchlorate prior to recycling for platinum recovery (derived from the anodes). The recyclable material contains diatomaceous earth, platinum, chromium, sodium chloride, sodium perchlorate, sodium carbonate, and calcium carbonate (Reference K275, K278).

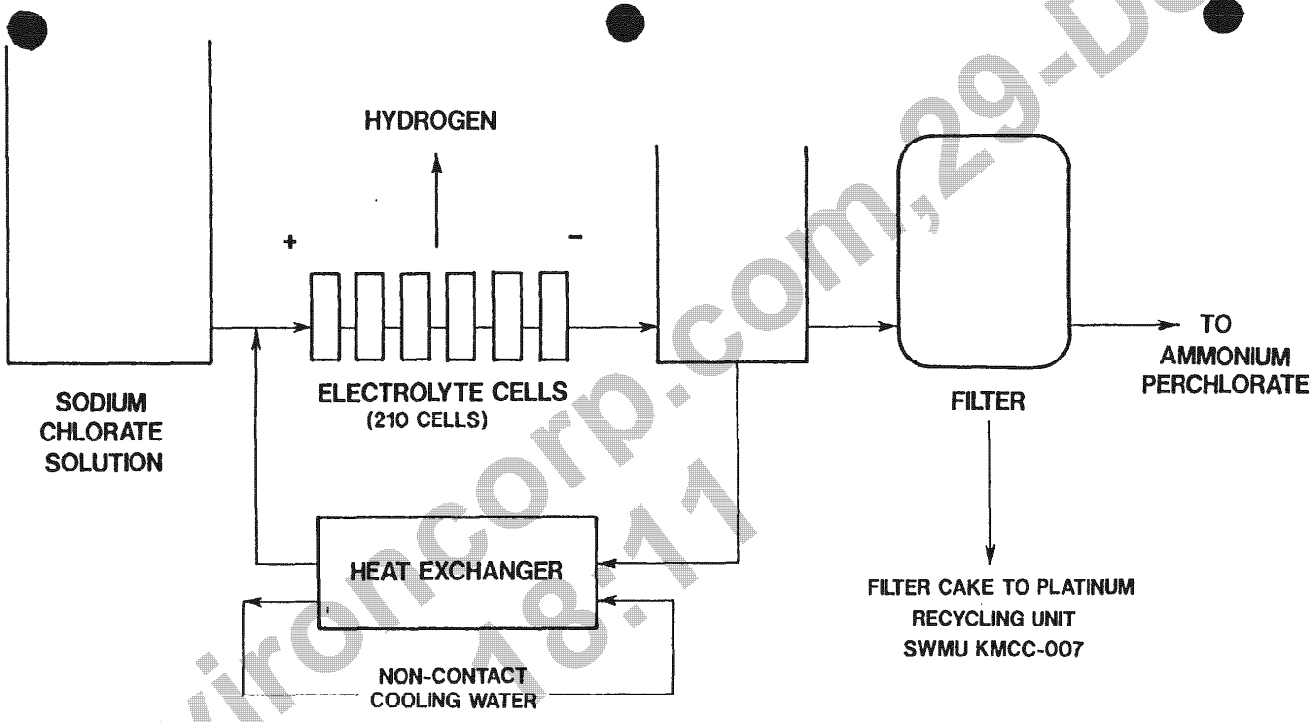
The cell bottoms and filter cake material are from two different parts of the same process train. The platinum present in both sources is derived from the anodes in the sodium perchlorate cells. The cell bottoms contain platinum, chromium, sodium chloride, sodium perchlorate, sodium carbonate, and calcium carbonate. The filter cake, which results from filtering the process solution, contains the same constituents plus the diatomaceous earth (pre-coat) filter medium (Reference K275, K278).

In approximately 1964, process modifications occurred and platinum bearing material was recovered for recycling (Reference K361). Prior to initiation of these modifications, the solids (cell bottoms and filter washings) were sluiced with process liquid wastes to the BMI ponds via the Beta Ditch (Reference K037, K056, K347).

Since 1964, the cell bottoms and filter cake materials have been recycled in one of three manners. Between approximately 1964 and 1970, the moist filter cake and cell bottoms were shipped off-site for platinum recovery. Between approximately 1970 and 1983, the filter cake was burned (on-site) in electric ovens near Unit 5 before being shipped off-site for platinum recovery. This was done to destroy the sodium perchlorate and obtain a higher recycling value. Since 1983, the cell bottoms and filter cake have been washed and either drummed directly or sent to SWMU (KMCC-007)

platinum recycling unit to be dried prior to being drummed and shipped off-site to a third party company for precious metal recovery of platinum (Reference K335, K336, K357, K361, K366).

Prior to January 1976, the liquid wastes were routed to the BMI ponds via the Beta Ditch (Reference K037, K056, K347). This liquid waste consisted of a brine rinse and washwater from water softeners (Reference K277). Sodium perchlorate process wastes were discharged to lined on-site surface impoundments S-1 and P-1 from the mid-1970s to prior to January 1983 (Reference K037, K039, K095, K124). After January 1983, liquid effluent from sodium perchlorate operations were recycled back to the process (Reference K357).



Modified after flow diagram provided by KMCC. Reference DOC #K117.

FIGURE 4.4.1
SODIUM PERCHLORATE PROCESS

31-135909-004

4.5 Potassium Perchlorate Process (Unit 4)

4.5.1 General Description

Potassium perchlorate was produced at the KMCC Henderson, Nevada site from 1945 until 1983 in Unit 4. Potassium perchlorate production used the same equipment as potassium chlorate production. Table 4.5.1 summarizes the amount of potassium perchlorate produced as a finished product.

TABLE 4.5.1

POTASSIUM PERCHLORATE PRODUCTION - TONS
(Reference K176)

Year	$KClO_4$ Finished	
1951	3,077	
1952	3,605	
1953	3,562	
1954	158	
1955	651	
1956	490	
1957	336	
1958	309	
1959	378	
1960	150	
1961	122	
1962	206	
1963	117	
1964	222	
1965	0	
1966	161	
1967	304	
1968	465	
1969	535	
1970	516	
1971	344	
1972	463	
1973	526	
1974	768	
1975	266	
1976	763	
1977	949	
1978	762	
1979	830	
1980	524	
1981	386	
1982	359	
1983	(2)	(*)

Note: The production amounts between 1945 and 1950 are not known.

(*) Negative number: Accounting procedure to adjust finished product tonnage which is less than production records indicate was manufactured over total years of production.

4.5.2 Raw Materials Used

The raw materials used in the production of potassium perchlorate included sodium perchlorate and potassium chloride (Reference K037, K253, CA017).

4.5.3 Production Process Flow Description

Potassium perchlorate was produced by KMCC and its predecessors between 1945 and 1983 following the same general double decomposition process as potassium chlorate, with a few modifications resulting from different physical and chemical properties.

The reaction employed was:

$$NaClO_4 + KCl \leftrightarrow KClO_4 + NaCl$$

The very low solubility of potassium perchlorate in cold aqueous solution permitted almost complete recovery of perchlorate values from the mother liquor by refrigeration (Reference K253).

Dry potassium chloride was mixed with water in a dissolving tank and heated. The hot potassium chloride solution was filtered and added to a crystallizer tank containing sodium perchlorate solution. Crystallization of potassium perchlorate occurred immediately upon mixing. The batch was cooled with ammonia cooled votators and readied for recovery (Reference K253).

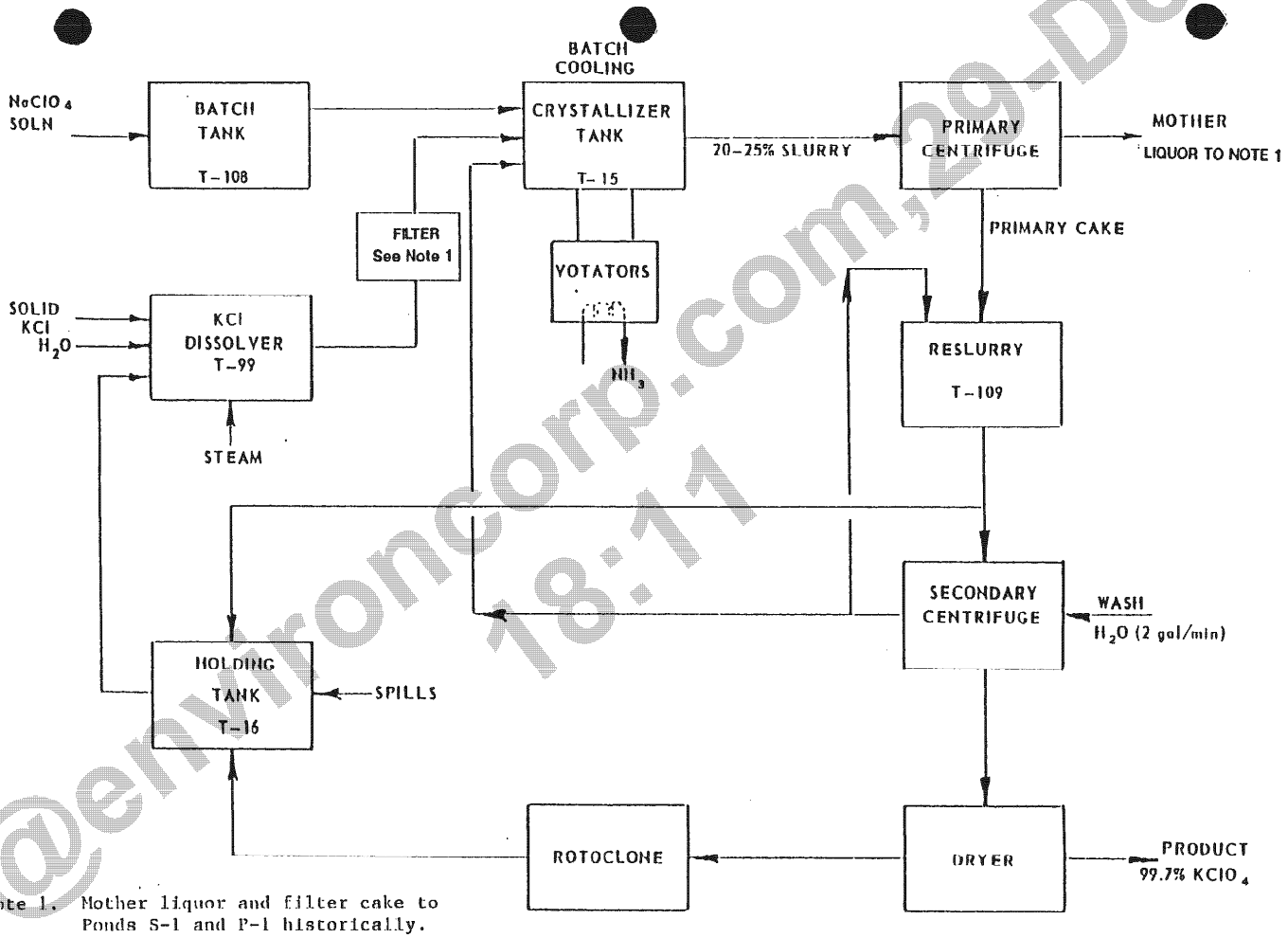
Potassium perchlorate crystals were recovered from a slurry in a primary centrifuge and washed. The centrifuge mother liquor was discharged to the Beta Ditch via the storm sewer or to on-site ponds S-1 and P-1 via piping and represented a loss of $KClO_4$, KCl, $NaClO_4$ and NaCl (Reference K253).

Crystals from the centrifuge were re-slurried and filtered again in a second centrifuge. The second centrifuge cake was fed to a counter-current, gas-fired rotary dryer and the dried product proceeded to storage. From storage the product was ground, screened, and packed to customer specification. Fines produced during this later process were collected in a wet scrubber control device (CCHD/APCD permit number A09506) and recycled back to the production process at the crystallizer (Reference K357).

Off-specification potassium perchlorate was redissolved and returned to the process flow for reprocessing (Reference K357). From 1945 to prior to January 1976, liquid and solid wastes from the potassium perchlorate process were discharged to the BMI ponds via the Beta Ditch (Reference K037, K056, K347). From January 1976 to 1983, these liquid and solid waste streams were discharged to the lined on-site surface impoundments S-1 and P-1. A period of operations modification for compliance with "zero discharge" occurred between 1972 and January 1976. During that time, product and waste liquids were alternately discharged to the SIs and BMI ponds as operations required (Reference K031, K037, K039, K095, K124, K366). Potassium perchlorate production ceased at the KMCC facility in September 1982 (Reference K095, K124). Section 5.0 of this report provides further information on S-1 and P-1 surface impoundments.

4.5.4 Waste Stream Characterization

Potassium perchlorate process wastes consisted of sluiced filter cakes. This material is comprised chiefly of a colloidal suspension of diatomaceous earth in a aqueous solution of potassium perchlorate mother liquor, sodium chloride, potassium chloride, potassium chlorate, sodium perchlorate, sodium carbonate, calcium carbonate, and chromium (Reference K083, K278, CA017). This solid and liquid waste was conveyed to the discharge point as a single stream. The different discharge receptacles are described in Section 4.5.3.



Note 1. Mother liquor and filter cake to Ponds S-1 and P-1 historically.

Modified after flow diagram provided by KMCC. Reference DOC #K253.

31-135909-004

4.6 Magnesium Perchlorate Process (Unit 5)

4.6.1 General Description

Magnesium perchlorate was produced at the KMCC Henderson, Nevada site between 1969 and 1976 and marketed as a solution. The equipment was located in the northeast end of Unit 5. Table 4.6.1 summarizes the amount of magnesium perchlorate produced as a finished product.

TABLE 4.6.1

MAGNESIUM PERCHLORATE PRODUCTION - TONS
(Reference K176)

Year	$Mg(ClO_4)_2$ Finished
1969	12
1970	6
1971	0
1972	180
1973	247
1974	249
1975	42
1976	(8)(*)

Note:

(*) Negative number: accounting procedure to adjust finished product tonnage which is less than production figures indicate should have been manufactured over total years of production.

4.6.2 Raw Materials Used

The following raw materials were used in the production of magnesium perchlorate (Reference K037, K255):

- magnesium carbonate;
- ammonium perchlorate;
- water;
- hydrochloric acid; and
- barium hydroxide.

4.6.3 Production Process Flow Description

Magnesium perchlorate solution was prepared by the reaction of magnesium carbonate and ammonium perchlorate, with steam condensate as the liquid carrier. Magnesium carbonate is only slightly soluble and reacted only as the ammonia and carbon dioxide were removed by a slow process of steam distillation. The ammonia given off was absorbed in a counter-current packed tower scrubber, using neutral to slightly acidic ammonium salt solution as the recirculating liquor. After the reaction was completed, the magnesium perchlorate batch was concentrated. Air and steam were turned off and the batch was allowed to settle before draining from reactor tank to a settling/storage tank. Figure 4.6.1 depicts the magnesium perchlorate process (Reference K255).

Sulfate impurity was removed by adding barium hydroxide. Chloride and chlorate impurities were removed by electrolysis of the concentrated magnesium perchlorate solution. Magnesium carbonate was added as necessary for pH control (Reference K255).

After settling and pH adjustment in storage tanks, the purified solution was filtered through a horizontal plate filter and packaged or bulk loaded for shipment (Reference K255).

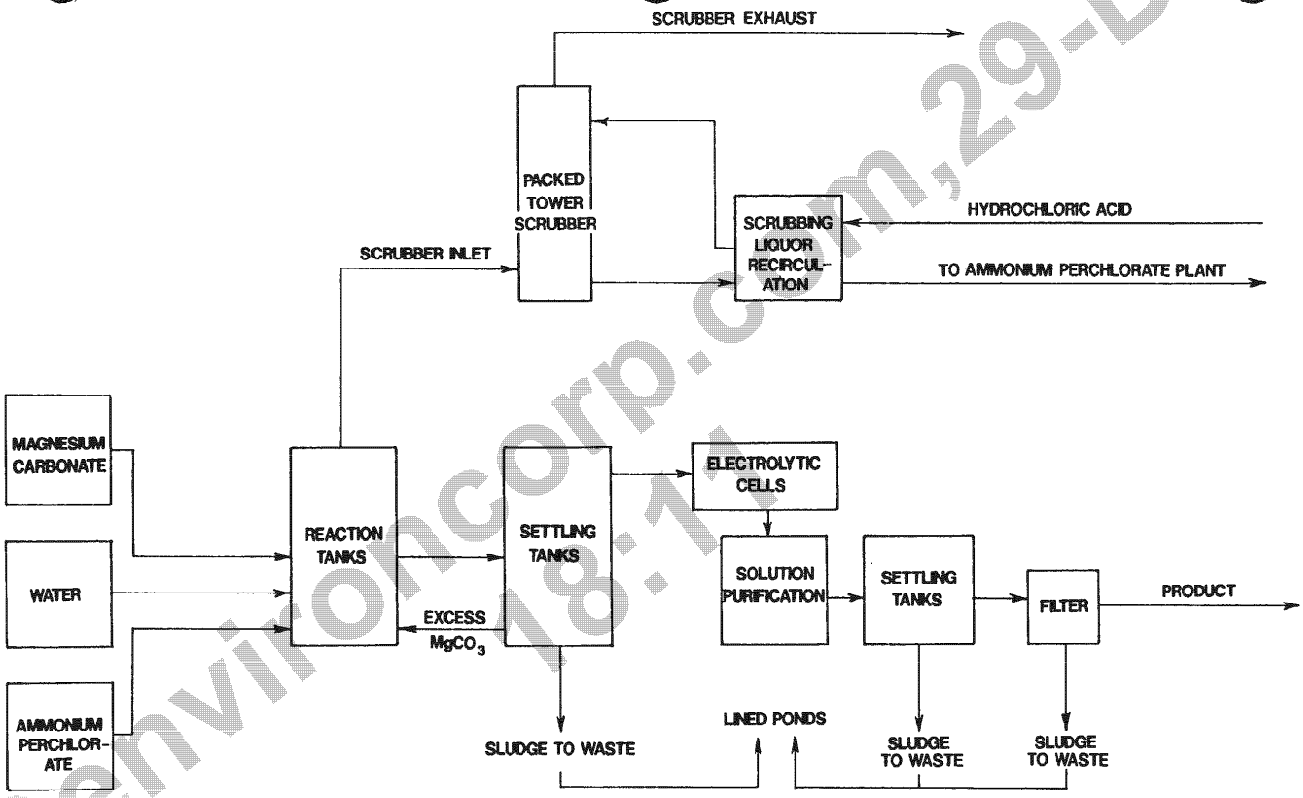
Off-specification magnesium perchlorate solution was returned to the production flow for reprocessing (Reference K357).

From 1969 to prior to January 1976, liquid wastes from the magnesium perchlorate process were discharged to the BMI ponds via the Beta Ditch (Reference K037, K056, K347). These liquid wastes were discharged to on-site surface impoundments S-1 and P-1 during the mid 1970's until production of magnesium perchlorate ceased at the KMCC facility in 1976 (Reference K037, K039, K176, K255). Section 5.0 of this report provides further descriptions on the S-1 and P-1 surface impoundments.

4.6.4 Waste Stream Characterization

Magnesium perchlorate process wastes resulted from filter cakes and process area washdowns. The liquid stream was composed of magnesium carbonate, ammonium perchlorate, magnesium perchlorate and water. These wastes were often co-mingled as "perchlorate" wastes generated from the various simultaneously ongoing perchlorate

production processes occurring at the facility between 1945 and the mid-1970s. Between 1945 and January 1976, wastes produced by the perchlorate processes were discharged to the BMI ponds (Reference K037, K056, K347). Perchlorate wastes, including magnesium perchlorate production wastes, were discharged to the lined on-site surface impoundments S-1 and P-1 during the mid 1970s (Reference K037, K039). It was during this same time (1976) that magnesium perchlorate production ceased at the KMCC facility (Reference K037, K176, K255).



Modified after flow diagram provided by KMCC. Referenced DOC #K255; K170, K179.

FIGURE 4.6.1
MAGNESIUM PERCHLORATE PROCESS
FLOW DIAGRAM

31-135909-004

4.7 Ammonium Perchlorate Process

4.7.1 General Description

The major portion of the sodium chlorate produced at the KMCC Henderson, Nevada site is used to produce ammonium perchlorate (AP). Ammonium perchlorate has been produced on-site since 1951 in a separate part of the facility near the central portion of the site.

Table 4.7.1 summarizes the amount of ammonium perchlorate produced as a finished product. From 1969 to 1976, some ammonium perchlorate was also used to produce magnesium perchlorate (Reference K176).

TABLE 4.7.1

AMMONIUM PERCHLORATE PRODUCTION - TONS
(Reference K176)

Year	NH_4ClO_4 Finished
1951	379
1952	1,218
1953	1,571
1954	3,974
1955	3,239
1956	3,738
1957	3,427
1958	6,746
1959	10,888
1960	5,600
1961	10,279
1962	8,511
1963	11,220
1964	9,240
1965	3,841
1966	6,511
1967	8,456
1968	5,893
1969	6,001
1970	7,692
1971	3,835
1972	7,576
1973	6,781
1974	6,163
1975	4,443
1976	5,152
1977	5,857
1978	5,151
1979	6,542
1980	6,282
1981	6,174
1982	7,075
1983	8,531
1984	12,366
1985	14,116
1986	14,758
1987	14,053
1988	15,368
1989	18,033
1990	18,478

4.7.2 Raw Materials Used

The following raw materials are used in the production of ammonium perchlorate (Reference K037, K253, CA017).

- o sodium perchlorate;
- o anhydrous ammonia;
- o hydrochloric acid;
- o soda ash;
- o caustic soda;
- o cellulose filter aid;
- o diatomaceous earth;
- o tricalcium phosphate (anti-caking agent); and
- o sulfur dioxide.

4.7.3 Production Process Flow Description

The main AP production process is presented first, followed by a section on the AP process evaporation ponds, also known as AP surface impoundments. Figure 4.7.1 is a simplified process flow diagram of the ammonium perchlorate production process.

Ammonium perchlorate is produced from the double decomposition reaction:

$$NaClO_4 + NH_3 + HCl \rightarrow NH_4ClO_4 + NaCl$$

This reaction occurs in the symbol labeled "Reactor" on Figure 4.7.1. Sodium chloride produced in this process is cycled back to the sodium chlorate process.

The acid and ammonia used in this reaction are of high purity and need no treatment before introduction to the process. However, the feed sodium perchlorate must be treated and "purified" before it can be used (Reference K253).

This sodium perchlorate purification process step is not shown on Figure 4.7.1. Recycled sodium perchlorate in the AP production scheme is treated in the area labeled "Purification" on Figure 4.7.1.

The impurities in the sodium perchlorate solution include sodium chlorate, calcium anions, and sodium dichromate. The chromate impurity is completely removed from the sodium perchlorate solution before entering the process by reduction with sulfur dioxide and is removed from treated solution by filtration (Reference K253).

Soda ash is also used in this purification step to precipitate calcium impurity from the perchlorate solution. The cakes generated in this purification process at filters AY-7 and AY-13 contain chromic hydroxide and calcium carbonate. This filter cake is routed to AP surface impoundments AP-1 and AP-2 (Reference K031, K039, K158A).

Another impurity to be removed from the sodium perchlorate solution is sodium chlorate. The chlorate destruction process occurs in one of the first vessels in a series of reaction vessels located near the crystallizer building. Chromate free sodium perchlorate solution is mixed with hydrochloric acid and ammonia, to decompose the chlorate impurity (Reference K253). The equipment is not shown on Figure 4.7.1.

Prior to approximately January 1976, the chlorate destruction vapors were historically passed through a lime scrubber tower (chlorine gas scrubber CCHD/APCD Permit Number A09503) in which chlorine, chlorine derivatives, and hydrochloric acid were absorbed. This waste stream was then discharged to the Beta Ditch, co-mingled with other liquid waste streams, and discharged to the BMI ponds (Reference K037, K253).

After 1976, solution from the chlorine gas scrubber was recycled to the sodium chlorate operations.

The particulate air emissions control devices consist of Rotoclones (CCHD/APCD Permit Numbers A09512 and A09516) (Reference K372). KMCC utilizes type "N" Rotoclones. Type N Rotoclone cleans the air by the combined action of centrifugal force and a thorough intermixing of water and dust-laden air. The dust is separated from the air by means of a water curtain, created by the flow of air through a partially submerged stationary impeller. Air flowing through the impeller at a high velocity

conveys water with it in a very turbulent sheet. Submersion is accomplished by the centrifugal force exerted by rapid changes in direction of air flow which causes the dust particles to penetrate the water film and become permanently trapped.

Entrained moisture in the cleaned air is removed by specially designed, wide-space chevron eliminators or curved entrainment baffles.

The water in the reservoir is continually reused and since the water curtain is produced by the air flow, no pumps or nozzles are required. The water level is maintained by the overflow weir in a control box as long as a small amount of fresh water is supplied through the make-up water connection or by electrical controls that automatically add water, as required, to compensate for evaporation and water lost as the collected dust is removed from the unit.

The sodium chloride slurry is pumped from the crystallizer to a centrifuge. The crystal is separated from the mother liquor with the liquor recycled to the reactor system (Reference K253).

The sodium chloride crystal is washed with water to remove surface mother liquor, then drops to a conveyor feeding the sodium chloride calciner. The sodium chloride crystal washwater is routed to AP process surface impoundment AP-4 for reconcentration and eventual recycle back into the process. In the calciner, sodium chloride is heated above the decomposition temperature of ammonium perchlorate to remove the last small amounts of ammonium perchlorate in the salt. The perchlorate-free sodium chloride is conveyed to hopper cars for recycling to the sodium chlorate plant, while the dust from the calciner operation is used for water softener regeneration at the crystallizer building (Reference K158A, K253).

The handling of the ammonium perchlorate crystals recovered at the "NH_4ClO_4 centrifuge", as labeled on Figure 4.7.1, is presented in the following paragraphs. The ammonium perchlorate crystal from the centrifuge is re-slurried and pumped to a concentrator and centrifuge in the dryer building. The mother liquor from the re-slurry

loop is returned to the crystallizer building. The ammonium perchlorate is dried and passed to the screening equipment (Reference K253).

The ammonium perchlorate from the screening operation passes into double cone blenders from which it is packed into lots. Anti-caking agents may be added to the blended lots to customer specification (Reference K253).

Nearly all of the ammonium perchlorate shipped has been cross blended to produce homogeneous, blended lots. All cross blended material can be packed, stored, and shipped in either drums or bins (Reference K253).

Off-specification ammonium perchlorate is redissolved and returned to the production flow for reprocessing (Reference K357).

KMCC operates five (5) lined on-site process surface impoundments (SIs) related to the manufacturing of ammonium perchlorate. The SIs are designated AP-1 through AP-5. These SIs are used to temporarily store solutions from the production process and AP plant cooling towers for recycling to the process. A brief summary of each follows.

AP-1 and AP-2

The AP-1 SI is equipped with a double liner system. The bottom liner consists of a 40 mil. high density polyethylene (HDPE) membrane, the side underliner is comprised of 400 gm/m^2 weight polypropylene geotextile, and the top liner consists of 60 mil. HDPE. This SI has an approximate surface area of 14,000 square feet and an approximate volume of 370,000 gallons (Reference K158A).

The AP-2 SI is a single lined impoundment. The bottom liner consists of polyvinyl chloride (PVC) and the side underliner is comprised of reinforced butyl rubber. The SI has an approximate surface area of 14,000 square feet and an approximate volume of 400,000 gallons (Reference K158A).

Process solutions from sodium perchlorate purification and filter wash liquor from ammonium perchlorate purification are temporarily stored in these SIs. SIs AP-1 and AP-2 serve the same purpose with only one SI being active at any given time

(Reference K031, K039, K158A). Both SIs have recently had the sludge removed from them. This sludge removal occurred in October and December in 1989. The sludge was disposed off-site at U.S. Ecology in Betty, Nevada (Reference K371) (see Table C-1).

AP-3

SI AP-3 is equipped with a double liner system. The bottom liner consists of a 40 mil. HDPE membrane, the side underliner is comprised of polypropylene geotextile with a weight of 400 gm/m^2, and the top liner consists of 60 mil. HDPE. The SI has an approximate surface area of 2,000 square feet and an approximate volume of 65,000 gallons (Reference K158A).

This SI is used as a pump basin for liquids stored in SIs AP-1 and AP-2 from filter wash liquor of sodium perchlorate/ammonium perchlorate purification. The process solutions stored in AP-3 are the same as described above for surface impoundments AP-1 and AP-2 (Reference K031, K039, K158A). The sludge was recently removed from this SI and disposed off-site at U.S. Ecology (Reference K253).

AP-4

The AP-4 SI is equipped with a double liner system. The bottom liner consists of a 40 mil. HDPE membrane, the side underliner is comprised of polypropylene geotextile with a weight of 400 gm/m^2, and the top liner consists of 60 mil. HDPE. The SI has an approximate surface area of 20,000 square feet and an approximate volume of 720,000 gallons (Reference K158A).

This SI functions as a surge basin to store unusual flows from the ammonium perchlorate cooling towers. Additionally, salt crystallizer washout and minor flows from the ammonium perchlorate process are routed to this SI. Liquor from this SI is used to make up for evaporation losses in SIs AP-1 and AP-2, thereby being returned to the process (Reference K031, K039, K158A).

AP-5

SI AP-5 is equipped with a double liner system. The bottom liner consists of a 40 mil. HDPE membrane, the side underliner is comprised of polypropylene geotextile with a

weight of 400 gm/m^2, and the top liner consists of 60 mil. HDPE. The SI has an approximate surface area of 35,000 square feet and an approximate volume of 1,817,000 gallons (Reference K158A).

This SI also functions to contain flows from the ammonium perchlorate cooling tower (Reference K158A).

KMCC files document that prior to January 1976, the dissolving tank, dryer feed screw and cyclone dust (Rotoclone) generating streams were slurried to the BMI ponds via the Beta Ditch. The combined stream carried about two to three tons per day of salt (Reference K278, K347). Other discharges were associated with AP Plant filters AY-7 and AY-13. These discharges contained NH_4ClO_4, NaCl, $NaClO_4$, $Cr(OH)_3$, and $Fe(OH)_3$ (Reference K278).

4.7.4 Waste Stream Characterization

From 1951 to 1974, the ammonium perchlorate filter cake from AP plant filters AY-7 and/or AY-13; and the dissolving tank, dryer feed screw, and cyclone dust (Rotoclone) generating stream were slurried via the Beta Ditch to the BMI ponds. As noted previously, this combined stream contained NH_4ClO_4, NaCl, $NaClO_4$, $Cr(OH)_3$, and $Fe(OH)_3$. In May 1974, process modifications were completed to change this waste stream to a recycled product stream. Consequently, three surface impoundments were constructed. Ammonium perchlorate filter wash liquor and filter cake from the sodium perchlorate filtration and purification process, and the aforementioned dissolving tank, dryer feed screw, and cyclone dust (Rotoclone) generating streams are currently routed to surface impoundments AP-1, AP-2 and AP-3. The solution in these lined on-site impoundments is concentrated by evaporation and recycled back to the process (Reference K031, K039, K158A, UE030).

These three AP process surface impoundments (AP-1, AP-2, and AP-3) were placed into service in May 1974. Solids were removed from some of the SIs (pre-1980) and in 1983, 1989, and 1990. The solids were washed, filtered and dried, then sent to an

off-site disposal facility as nonhazardous wastes. The solids consisted of $CaCO_3$, $CaSO_4$, $MgSO_4$, $Cr(OH)_3$ and diatomaceous earth (Reference K210, K214, K305, K320, UE030).

Currently, sodium chloride calciner scrubber liquid is recycled back to the AP process. This liquid contains ammonium chloride, neutralized carbonic acid, and neutralized dilute hydrochloric acid (Reference K253).

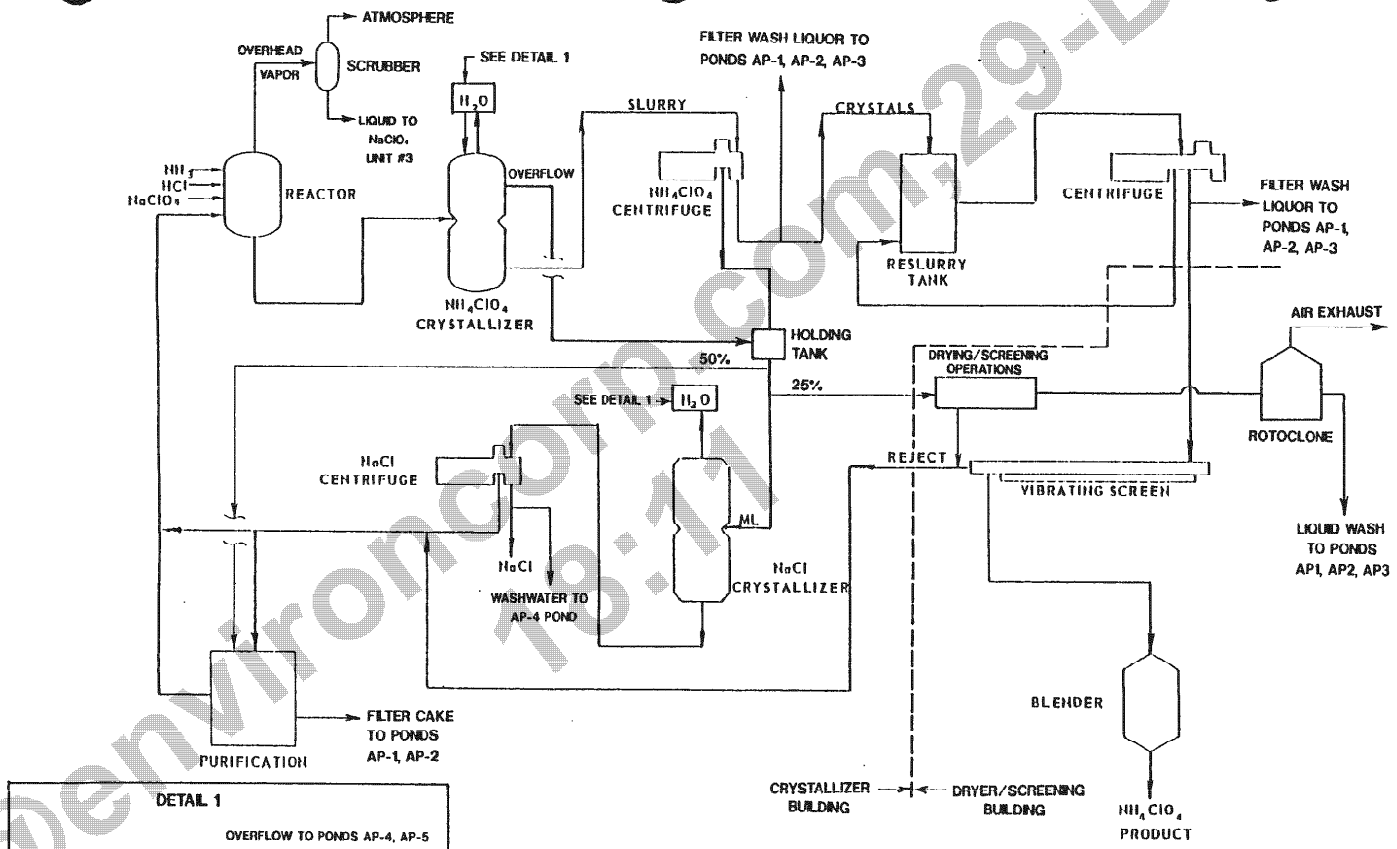
Caustic scrubber solution (NaOH) from the AP process is recycled to sodium chlorate production through Pond New P-2 or directly to chlorate operations. This effluent was formerly discharged to Pond Old P-2 formerly discharged to Pond Old P-2 (Reference K357).

The AP cooling tower overflows historically drained via the Beta Ditch to the BMI ponds. Currently the overflow is routed through an underground line to surface impoundments AP-4 and AP-5. The overflow solution consists of ammonium perchlorate and sodium chloride (Reference K357).

Crystals from the "NaCl Crystallizer", "NH_4ClO_4 Crystallizer" and the "AP Centrifuge" are separately washed with water. The resulting washwater is routed to SI AP-4. The liquor is concentrated by evaporation and is eventually recycled back to the AP production process (Reference K039, K253).

Emission control devices (Rotoclones-CCHD/APCD Permit Numbers A09512 and A09516) (Reference K372) capture the dust generated during NH_4Cl0_4 drying, screening, and packaging. The Rotoclones are water bath emission control devices. Ammonium perchlorate particulates are dissolved in the water bath and recycled to the product process.

Discharges from the lime scrubber tower (chlorine gas scrubber) emission control device are currently permitted under CCHD/APCD Permit Number A09503. Emissions from this scrubber are non-depositional.



Modifed after flow diagram provided by KMCC. Reference DOC #K253; K117.

FIGURE 4.7.1

31-135909-004

4.8 Manganese Dioxide Process (Unit 6)

4.8.1 General Description

Manganese dioxide ore is reduced, leached, and the leachate purified to produce a concentrated manganese sulfate solution at the manganese dioxide leach plant (Please reference Section 4.9 of this report for a description of the manganese dioxide leach plant process). This solution is then fed to the electrolytic cells in Unit 6 where high purity manganese dioxide is plated out of solution. This high purity, battery active manganese dioxide is used in the manufacture of high quality dry cell batteries. Table 4.8.1 summarizes manganese dioxide production from 1951 through 1990 (Reference K176, K253).

TABLE 4.8.1

MANGANESE DIOXIDE PRODUCTION - TONS
(Reference K176)

Year	MnO_2 Finished
1951	251
1952	590
1953	2,355
1954	3,030
1955	3,576
1956	4,052
1957	4,385
1958	3,548
1959	819
1960	1,825
1961	2,935
1962	2,590
1963	4,440
1964	4,018
1965	3,960
1966	5,284
1967	5,922
1968	6,419
1969	6,059
1970	4,670
1971	5,631
1972	7,257
1973	8,516
1974	8,689
1975	7,573
1976	8,831
1977	11,283
1978	11,783
1979	12,131
1980	11,761
1981	11,647
1982	8,768
1983	6,062
1984	7,384
1985	6,091
1986	9,279
1987	11,921
1988	10,924
1989	15,054
1990	15,815

4.8.2 Raw Materials Used

The materials used in the production of high purity manganese dioxide in Unit 6 include manganese sulfate solution from the leach plant and paraffin wax (Reference K117, K253).

4.8.3 Production Process Flow Description

Figures 4.8.1, 4.8.2, and 4.8.3 provide simplified process block flow diagrams for electrolysis of MnO_2, classifying finished MnO_2 product, and packaging of finished MnO_2 product (Reference K253).

A relatively pure manganese sulfate solution is fed to the electrolytic cells where the manganese dioxide is plated out:

$$MnSO_4 + 2H_2O \xrightarrow{2e^-} MnO_2 + H_2SO_4 + H_2\uparrow$$

The cell solution is recycled back to the leach plant for reuse. Figure 4.8.1 is a flow diagram of the manganese dioxide electrolysis process (Reference K253). The electrolytic cell process is permitted by CCHD/APCD Permit Number A09520Z (Reference K372).

The pure manganese dioxide is stripped from the anode, crushed to pass through a U.S. Standard sieve and washed to remove residual manganese sulfate and sulfuric acid. The powdered manganese dioxide is then filtered, dried, and bagged for shipment. The exhaust from the drier passes through a cyclone to a baghouse. The baghouse is permitted by CCHD/APCD Permit Number A09521 (Reference K372). Figure 4.8.2 and 4.8.3 are flow diagrams of manganese dioxide handling systems (Reference K253).

Historically, the electrolytic cell was configured to use graphite anodes. A distinct and separate cathode was not needed in the manganese dioxide cells. The spent graphite anodes were crushed along with the manganese dioxide, and then r anodes were cru

mechanical jig. Scrap and spent graphite anodes were sold to steel mills and foundries between 1960 through November 1981. The graphite anodes have since been replaced with titanium anodes (Reference K322, K323, K324).

In 1974 the system was modified with copper cathodes. These cathodes required washing. Manganese dioxide cathode wash solution has been discharged to lined on-site surface impoundments C-1 or MN-1 since 1975. Since 1989, the cathode wash solution has been discharged to SI MN-1. The wash solution consists of water, sodium hexametaphosphate, calcium, magnesium, manganese from cathode scale, and tank mud (Reference K117, K158A, K269). Descriptions of surface impoundments C-1 and MN-1 are provided in Sections 5.11 and 5.12, respectively. Prior to 1975, this solution did not exist.

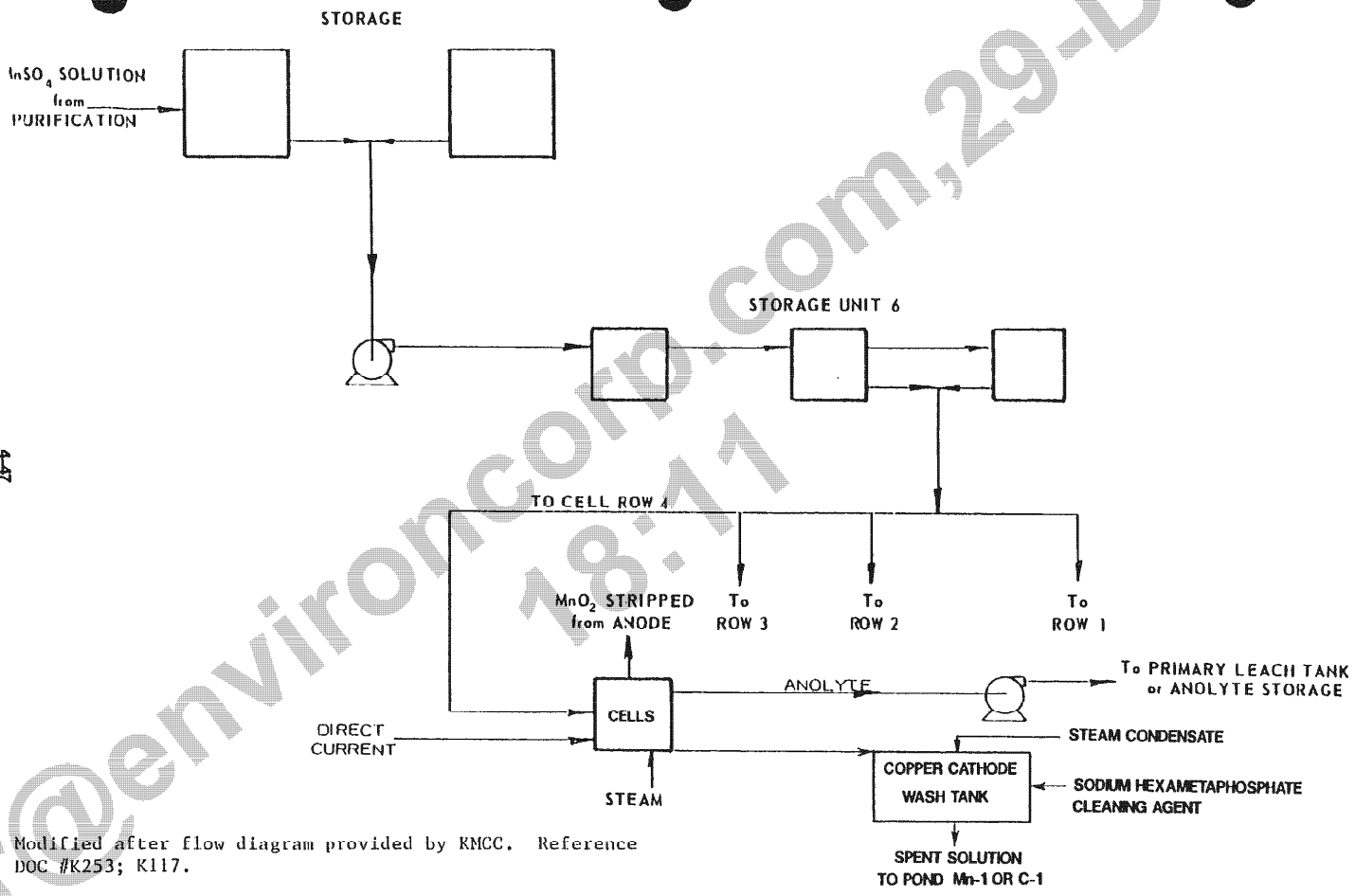
Off-specification manganese dioxide is returned to the production process for reprocessing (Reference K357).

Manganese dioxide product wash water was discharged to the City of Henderson sanitary sewer system prior to May 1989. This flow was diverted to on-site wastewater collection ponds WC-1 and WC-2 in May 1989 (Reference K158A, K356).

4.8.4 Waste Stream Characterization

Wastes from this process are collected and disposed of on-site or recycled back to the leach plant.

The cathode wash waste is a sodium hexametaphosphate solution used to clean the electrodes (Reference K253). The wash solution consists of water, hexametaphosphate, calcium, magnesium, manganese (from cathode scale), and tank mud (manganese dioxide). Prior to January 1976, this waste had been discharged to the lined on-site surface impoundments MN-1 and C-1 (Reference K117, K158A, K347). This solution was discharged to surface impoundment C-1 (circa 1980) in batches of approximately 5,000 gallons, once or twice a week (Reference ND004). After 1989, and continuing to present, this solution has been discharged to SI MN-1.



Modified after flow diagram provided by KMCC. Reference DOC #K253; K117.

FIGURE 4.8.1
MANGANESE DIOXIDE PROCESS

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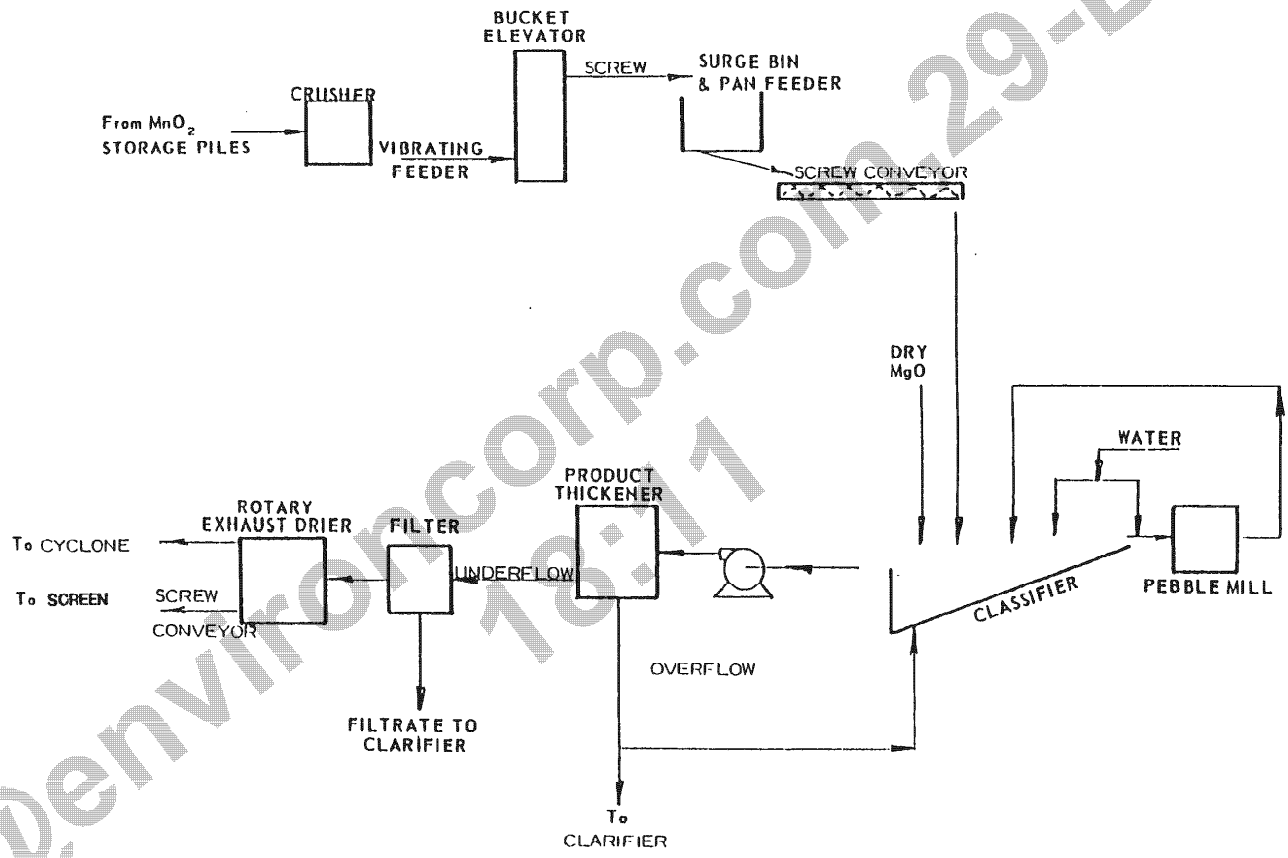
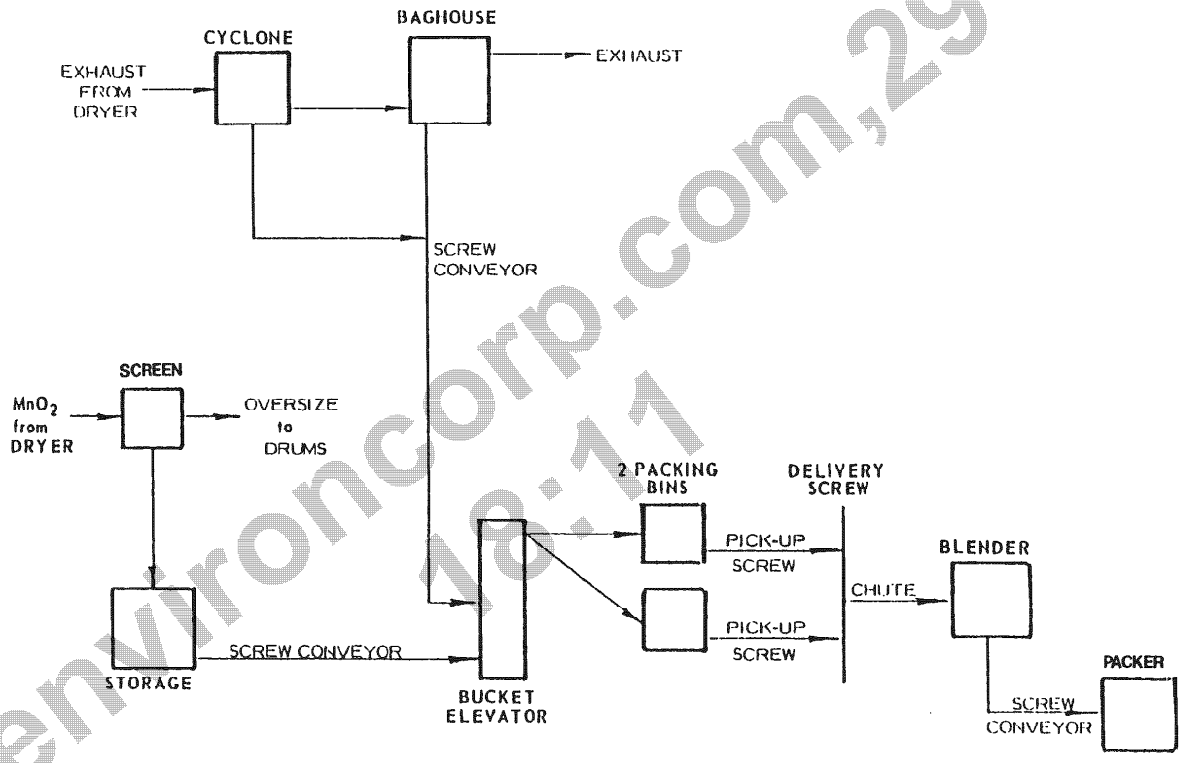


Flow diagram provided by KMCC. Reference DOC #K253.

FIGURE 4.8.2
MANGANESE DIOXIDE PROCESS

31-135909-004



Flow diagram provided by KMCC. Reference DOC #K253.

FIGURE 4.8.3
MANGANESE DIOXIDE PROCESS

31-135909-004

4.9 Manganese Dioxide Leach Plant

4.9.1 General Description

The manganese dioxide leach plant starts with manganese dioxide ore and produces a concentrated manganese sulfate solution. The solution is sent to electrolysis where high purity manganese dioxide is plated out of solution in Unit 6 (Please reference Section 4.8 for the description of the manganese dioxide process). The manganese dioxide leach plant is located north of Unit 6.

4.9.2 Raw Materials Used

The following raw materials are used in the leach plant area related processes (Reference K037, K253, CA017):

- o manganese dioxide ore (20 to 75 percent by weight manganese dioxide);
- o coal, coke or natural gas;
- o sulfuric acid;
- o barium sulfide;
- o diatomaceous earth;
- o lime (dolomitic);
- o hydrogen sulfide; and
- o flocculent.

4.9.3 Production Process Flow Description

Figures 4.9.1, 4.9.2, and 4.9.3 are simplified process block flow drawings of the manganese dioxide calcining, leaching, and purifying processes that occur in the leach plant area of the facility (Reference K253).

Figure 4.9.1 is a flow diagram of the calcining process. Ground manganese ore is calcined on open hearths. These open hearths are operated under CCHD/APCD Permit Number A09516Z (Reference K372). During the calcining process, the insoluble

manganese dioxide is reduced to soluble manganese oxide. The calcined ore is slurried into a thickener with the underflow of solids from the thickener fed to the leach tanks. From approximately 1983 through September 1989, calcine belt filter washwater was used to rinse the manganese ore to remove potassium. This washwater was sent to surface impoundment Mn-1. The wastewater stream contained potassium, potassium phosphate, manganese, and other naturally occurring trace constituents. The calcine filter washwater was eliminated in September 1989 (Reference K117, K253, K334). The air exhaust from the hearths is directed toward a baghouse which controls particulate matter emissions. This device operates under CCHD/APCD Permit Number A09515Z (Reference K372).

Figure 4.9.2 is a flow diagram for the leaching process. Anolyte from the electrolysis cells and sulfuric acid are mixed with the ore slurry in the leach tanks and pumped to an acid thickener. The overflow from the thickener is used to slurry the calcined ore. The underflow from acid thickener is filtered and returned to the thickener. Prior to 1975, the filter sludge was not dewatered but discharged directly to leach beds in what is currently the permitted, nonhazardous tailings area (Reference K056, K253).

Currently, the filter cake (tailings) generated in the leaching step is washed and sent to the permitted, on-site nonhazardous tailings area (Reference K037, K039, K056).

Figure 4.9.3 is a flow diagram for the purification process. In the purification section either hydrogen sulfide or barium sulfide is/was added to the concentrated manganese sulfate solution to precipitate zinc, copper, cobalt, lead, and nickel. These metals are precipitated as sulfides, filtered, and sent to the permitted, on-site nonhazardous tailings landfill. Barium sulfide was historically used to precipitate sulfide solids from approximately 1951 to the mid-1970s. The use of hydrogen sulfide began in mid-1970. This conversion to hydrogen sulfide (a gas) accomplished two objectives: 1) it provided a faster reaction, and 2) it reduced the volume of precipitated solids that required handling. The overflow from the purification section thickeners is filtered and stored in the manganese dioxide plant (Reference K253, K275, K357, K366).

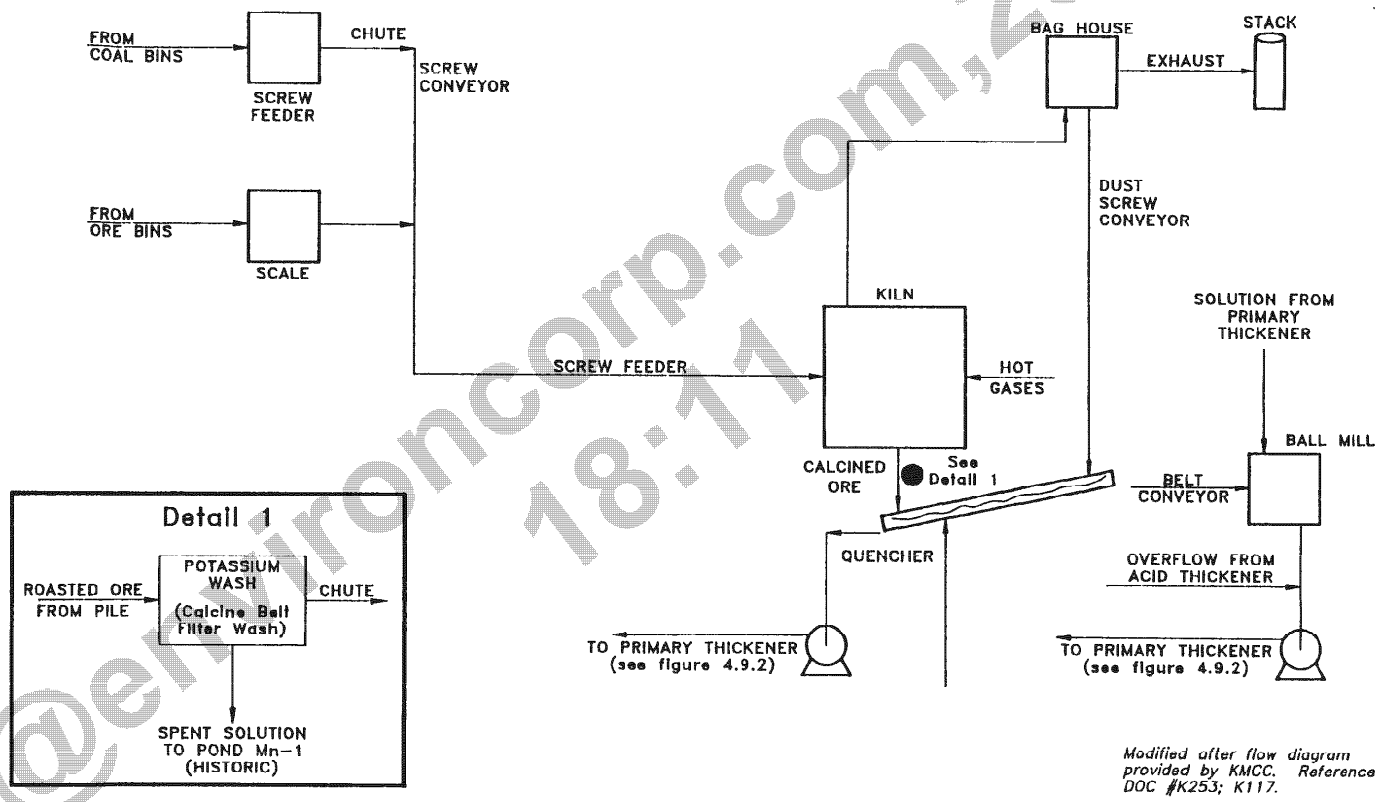
4.9.4 Waste Stream Characterization

The manganese dioxide leach plant area generates leach acid thickener underflow sludge consisting of undigested manganese dioxide ore, insoluble silica and alumina (Reference K037, K158A, K253, K357). This underflow sludge goes to a filter wash to remove the last soluble manganese, resulting in filter cake and liquid. The waste stream from this process includes:

- cake from the product filter generates a sludge consisting of sulfides of zinc, copper, lead, and nickel;
- the discontinued barium sulfide purification waste stream consisting of the sulfides of zinc, copper, lead, nickel, and barium; and
- the (historic) calcine belt filter wash containing potassium and potassium phosphate, manganese, and other naturally occurring trace constituents.

Prior to February 1975, the sludges were not filtered or dewatered before being discharged to the tailings area but were sluiced directly into on-site leach beds (Reference K037, K039, K056). By February 1975, KMCC had installed process filters (Reference K056, UE030) and filtered sludges are now sent to the on-site, nonhazardous tailings area (Reference K056). The liquid from the filters is recycled to the leach plant (Reference K253).

The sludge generated from the manganese dioxide cathode washdown activity has been sent to surface impoundment C-1 since October 1975. From 1989 to present, some of this manganese dioxide cathode washdown has been infrequently disposed of into surface impoundment MN-1 (Reference SWMU KMCC-012).



Modified after flow diagram provided by KMCC. Reference DOC #K253; K117.

FIGURE 4.9.1
MANGANESE DIOXIDE LEACH PLANT PROCESS
(CALCINING PORTION)
FLOW DIAGRAM

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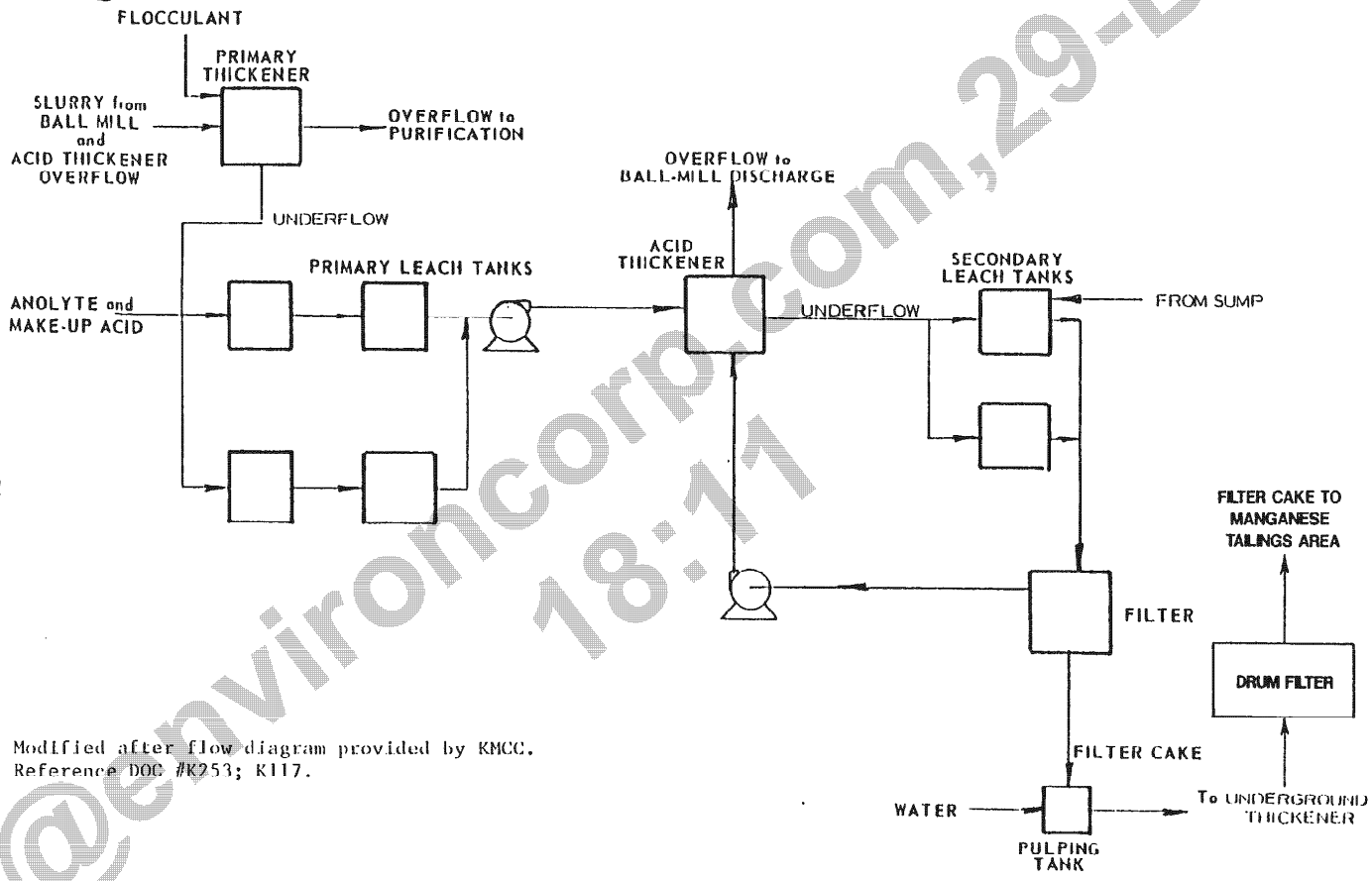
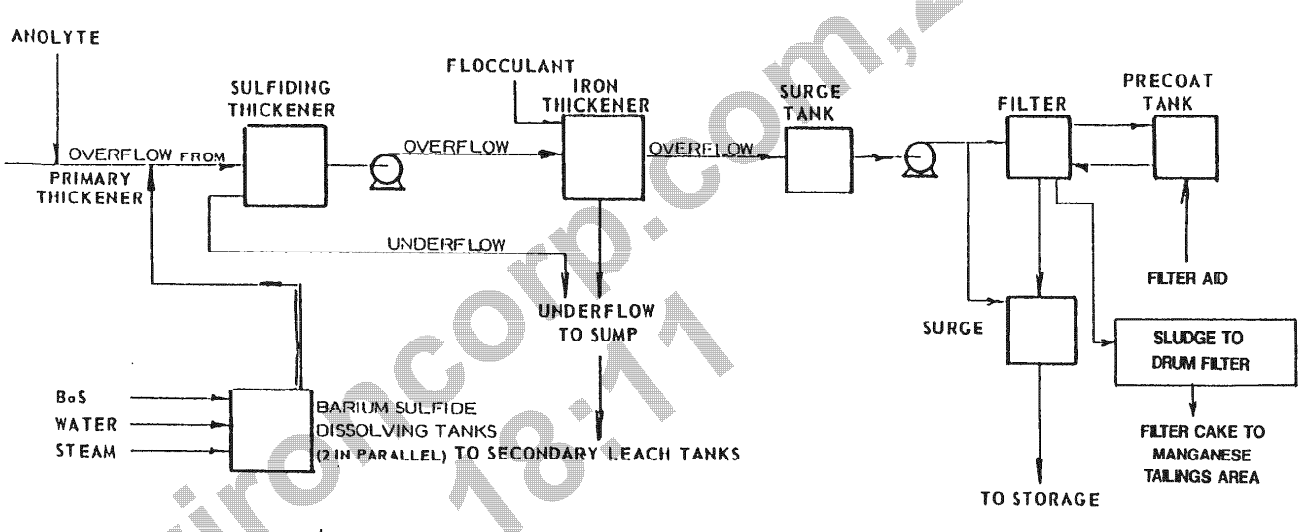


Modified after flow diagram provided by KMCC.
Reference DOC #K253; K117.

FIGURE 4.9.2
MANGANESE DIOXIDE LEACH PLANT PROCESS
(LEACHING PORTION)

31-135909-004



Modifed after flow diagram provided by KMCC. Reference DOC #K253.

FIGURE 4.9.3
MANGANESE DIOXIDE LEACH PLANT PROCESS
(PURIFICATION PORTION)
FLOW DIAGRAM

31-135909-004

4.10 Elemental Boron Process (Unit 5)

4.10.1 General Description

Elemental boron production was begun at the KMCC Henderson, Nevada site in 1972. Table 4.10.1 summarizes the amount of elemental boron produced as a finished product between 1972 and 1990.

TABLE 4.10.1

ELEMENTAL BORON PRODUCTION - POUNDS
(Reference K176)

Year	Boron
1972	1,841
1973	11,141
1974	10,049
1975	8,888
1976	8,288
1977	9,454
1978	14,108
1979	12,904
1980	21,303
1981	15,027
1982	14,547
1983	14,369
1984	11,263
1985	12,874
1986	8,646
1987	19,089
1988	11,865
1989	8,084
1990	9,983

4.10.2 Raw Materials Used

The raw materials used in the elemental boron process include the following (Reference K037, K258, CA017):

- o boric acid;
- o magnesium metal;
- o argon;

- o sulfuric acid, (98 percent);
- o steam; and
- o soda ash.

4.10.3 Production Process Flow Description

Figure 4.10.1 shows the flow diagram for the elemental boron process.

Anhydrous boric acid and magnesium metal are combined in a blender constituting a batch. The batch is blended and loaded into trays and ignited within a reaction chamber. When the reaction is complete, the product is ground in a crusher and prepared for leaching. The crushed product is transferred into a leaching tank containing water and sulfuric acid where magnesium oxide is leached from the elemental boron as magnesium sulfate (Reference K258).

After leaching, the contents of the leach tank are pumped to a filter where the boron cake is removed on filter plates. The filtrate is discharged to a neutralization tank, neutralized with soda ash, and then discharged to an evaporation pond (SI C-1). The boron cake is washed, dried, and milled in preparation for shipment (Reference K258).

Off-specification boron is returned to the production flow for reprocessing (Reference K357).

Between 1972 and January 1976, liquid wastes from the boron operations were discharged to the BMI ponds via the Beta Ditch (Reference K039, K347). Between January 1976 and January 1983, these wastes were discharged to lined on-site surface impoundments S-1 and P-1 (Reference K031, K037, K039, K347).

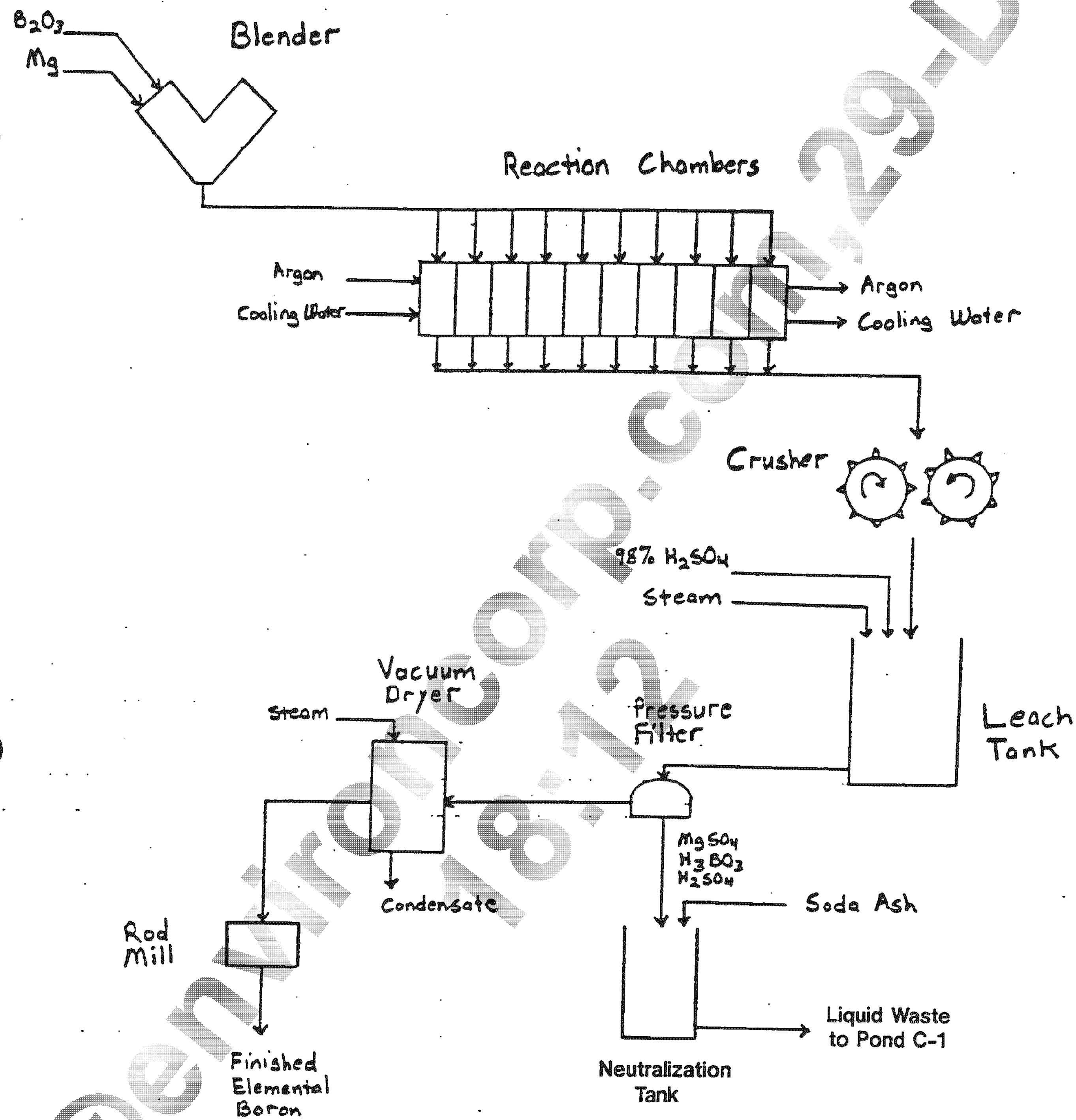
Surface Impoundment C-1 is an evaporation pond which began operation in October 1975. This lined on-site surface impoundment has received boron process neutralization tank waste solution from 1975 to present (Reference K158A).

4.10.4 Waste Stream Characterization

The waste stream generated in the production of elemental boron is a solution from the neutralization tank and is referenced as the "boron process neutralization tank waste

solution" (formerly called "boron leach liquor"). This liquid waste is generated as boron solids are filtered from the leach solution. This filtrate is acidic in nature and since 1975 has been sent to the neutralization tank where it is neutralized with soda ash prior to discharge to the C-1 surface impoundment. This neutralized waste stream is a slurry consisting of sodium carbonate, magnesium sulfate, sodium borate (Na_3BO_3) and sodium sulfate (Na_2SO_4) (Reference CA017).

Boron process neutralization tank waste solution from the elemental boron production leach tank was disposed from January 1976 to January 1983 to surface impoundments S-1 and P-1. SI C-1 has received this waste stream since 1975 (Reference K031, K083, K347). A review of Figure 4.10.1 reveals that the waste stream consisted of boron, magnesium sulfate ($MgSO_4$), neutralized sulfuric acid, neutralized boric acid, and water (Reference K117, K258).



Modified after flow diagram provided by KMCC. Reference DOC #K258; K117.

FIGURE 4.10.1
ELEMENTAL BORON PROCESS
FLOW DIAGRAM

4.11 Boron Trichloride Process (Unit 5)

4.11.1 General Description

Boron trichloride has been produced at the KMCC Henderson, Nevada site since 1972/1973 in Unit 5. Boron trichloride is a gas at ambient conditions and is typically handled as a liquid in pressurized containers. Table 4.11.1 summarizes the amount of boron trichloride produced as a finished product.

TABLE 4.11.1

BORON TRICHLORIDE PRODUCTION - POUNDS
(Reference K176)

Year	Boron Trichloride
1972	0
1973	342,257
1974	424,189
1975	449,575
1976	398,758
1977	668,399
1970	437,657
1979	476,939
1980	403,138
1981	437,658
1982	362,204
1983	472,363
1984	492,989
1985	539,319
1986	574,643
1987	482,152
1988	575,075
1989	629,316
1990	526,131

4.11.2 Raw Materials Used

The raw materials used in the production of boron trichloride include boron carbide (B_4C) and chlorine gas (Cl_2) (Reference K037, K117, K257).

4.11.3 Production Process Flow Description

The boron trichloride (BCl_3) process is shown in Figure 4.11.1.

The boron carbide is loaded into a reactor made of mild steel and an inner crucible of graphite. The boron carbide is heated when chlorine gas is introduced to the bottom of the reactor. The chemical reaction is exothermic and the reaction temperature is controlled by the chlorine feed rate. Once the reaction is completed, spent boron carbide ash (spent carbon residual) is removed by gravity flow through the bottom of the reactor. During the reaction, boron trichloride gas is continuously removed from the reactor to a condenser. The condenser is air cooled to condense metal halides and oxychlorides. Boron trichloride exits the condenser through a screen filter designed to capture entrained solids. The condenser is periodically cleaned by scraping the solid contaminants from the inner walls (Reference K257).

The boron trichloride gas is then fed to the crude distillation column to remove unreacted/reacted chlorine gas and non-condensable gases. The chlorine is recycled for later use in the boron carbide reactor. Boron trichloride gas is condensed to a liquid state at the condenser, and falls through the column to the crude reboiler. The reboiler vaporizes the boron trichloride liquid, and the vapor re-enters the crude distillation column. The condensation and vaporization of boron trichloride is repeated continuously to purify the boron trichloride. A portion of the boron trichloride is removed from the bottom of the distillation column and is fed to the refined reboiler and distillation column (Reference K257).

The refined distillation column removes silicon from the boron trichloride. Silicon is removed as silicon tetrachloride. Silicon tetrachloride ($SiCl_4$) has a higher boiling point than boron trichloride, and is accumulated in the refined reboiler. The boron trichloride is condensed and removed from the top of the second distillation column with a portion of the boron trichloride transferred to the boron trichloride product receiver. The remainder is sent back to the top of the refined distillation column to be reused (Reference K257).

Boron trichloride is temporarily stored in the product receiver and then transferred to a portable storage tank. Shipping cylinders are then filled with boron trichloride and shipped to customers (Reference K257).

Excess boron trichloride from the reactor and the refined distillation column is sent to a wet scrubber. The wet scrubber consists of a blower in combination with a water mist chamber which pick up the BCl_3 vapor and pass it through a water mist. The resulting water and HCl stream is recycled to the Unit 5 cooling tower for pH adjustment (Reference K357).

Off-specification boron trichloride is returned to the distillation column for reprocessing (Reference K357).

The BMI dump was used from 1972 to 1979 for disposal of the spent carbon (Reference K039). Between 1979 to present, the spent carbon waste has been sent off-site for disposal as a nonhazardous solid industrial waste (Reference K039).

Several surface impoundments were used for disposal of wastes throughout the history of the boron trichloride production. The waste streams from the boron trichloride production process result from the scrubber bottoms and spent carbon from the boron carbide reactor. This stream was discharged to the BMI ponds from 1972 to prior to January 1976. After use of the BMI ponds ceased in early January 1976, this liquid waste stream was discharged to the lined, on-site KMCC ponds, including surface impoundments S-1 and P-1. Scrubber bottom liquid wastes are currently sent to the Unit 5 cooling tower as pH control solutions for the tower (Reference K039, K056, K117, K170, K179, K347, K357).

Cooling tower blowdown and reboiler wastes were discharged to the BMI ponds from 1972 to prior to January 1976. From prior to January 1976 to present, these wastes have been discharged to the lined on-site ponds: first to P-1, then to S-1, and currently to C-1 (Reference K039, K056, K117, K170, K179, K257, K347). Discharge to S-1 and P-1 ceased prior to 1983 (Reference K357). The reviewed documents did not indicate precise dates of use for these ponds P-1, S-1, and C-1 for these discharges. Section 5.0 of this report provides further descriptions on these surface impoundments.

Halide wall solid waste and the screen filter waste are periodically scraped from the walls of the respective vessels and sluiced to Pond C-1 since 1983. Between 1983 and 1976, these wastes were sluiced to SIs P-1 and S-1. Prior to January 1976, the wastes were sluiced to the BMI ponds.

4.11.4 Waste Stream Characterization

Ash from the carbide reactor (spent carbon residue) is air classified to separate the carbon from the unreacted boron carbide. The carbide is recycled back to the reactor. From 1972 to 1979, the carbon was disposed of in the BMI dump. From 1979 to present, the carbon has been disposed of as a nonhazardous solid industrial waste in a sanitary landfill operated by Silver State Disposal in Clark County (Reference K039, K117).

High boiling compounds, mainly silicon tetrachloride, that collect in the reboilers are removed monthly and flushed to surface impoundment C-1. C-1 pond has received this material since the mid-1970s.

Scrubber liquid which contains dissolved chlorine and chlorine gas (as HC1) is stripped in the boron unit's cooling tower where it has been sent since 1972. The cooling tower blowdown and the reboiler waste streams were discharged to the BMI ponds from 1972 until prior to January 1976. Since January 1976, these wastes have been discharged to the lined, on-site surface impoundments: first to P-1, then to S-1. Discharge to SI C-1 began in 1983 and continues to the present (SWMU KMCC-011). These liquid waste streams contain sodium hexametaphosphate, neutralized sulfuric acid, manganese, sodium, sulfite and borate ions. The KMCC file documents report wastes from this area as "boron compounds" and include waste streams generated by the elemental boron, boron trichloride and boron tribromide production processes (Reference K039, K056, K117, K170, K179, K257, K347).

The halide wall solid waste and the screen filter waste are chiefly a solid silicate scale suspended in water used to sluice the suspension to SI C-1.

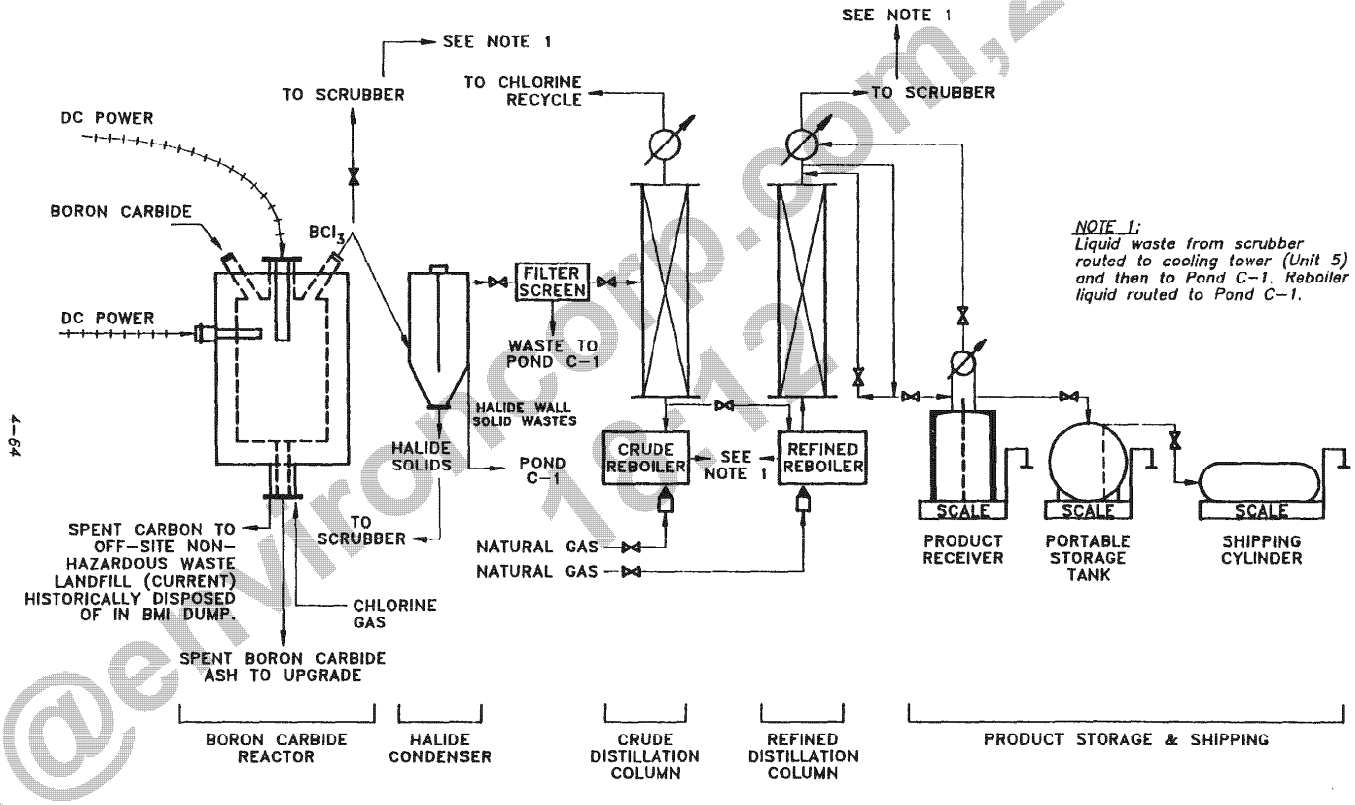


FIGURE 4.11.1
BORON TRICHLORIDE PROCESS FLOW DIAGRAM

Modified after flow diagram provided by KMCC. Reference DOC #K257, K39, K117.

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4.12 Boron Tribromide Process (Unit 5)

4.12.1 General Description

Boron tribromide has been produced at the KMCC Henderson, Nevada site since 1972/1973 in Unit 5. Boron tribromide is a gas at ambient conditions and is typically handled as a liquid in pressurized containers. Table 4.12.1 summarizes the amount of boron tribromide produced as a finished product.

TABLE 4.12.1

BORON TRIBROMIDE PRODUCTION - POUNDS
(Reference K176)

Year	Boron Tribromide
1972	0
1973	2,303
1974	1,014
1975	224
1976	(30)(*)
1977	(15)(*)
1978	1,830
1979	10,436
1980	11,092
1981	6,393
1982	21,164
1983	25,105
1984	22,788
1985	9,245
1986	71
1987	6,619
1988	4,432
1989	329
1990	(203)(*)

Note:

(*) Negative number: an accounting procedure to adjust the total finished amount of product which is less than the cumulative quantity production records indicate was manufactured during previous years of production.

4.12.2 Raw Materials Used

The raw materials used in the production of boron tribromide include boron carbide (B_4C), and bromine gas (Br_2) (Reference K037, K117, K257).

4.12.3 Production Process Flow Description

The boron tribromide (BBr_3) process is shown on Figure 4.12.1. The same equipment used for the production of boron trichloride is used for boron tribromide production. The process flow description is identical with the replacement of bromine gas (Br_2) in the boron tribromide process wherever chlorine gas (Cl_2) occurs in the boron trichloride process.

4.12.4 Waste Stream Characterization

The waste streams for the boron tribromide process are very similar to those described in Section 4.11.4 for the boron trichloride process. The primary difference is the formation of silicon tetrabromide rather than silicon tetrachloride. The KMCC file document reports wastes from this area as "boron compounds" and include waste streams generated by the elemental boron, boron trichloride, and boron tribromide production processes (Reference K039, K117, K170, K179, K257).

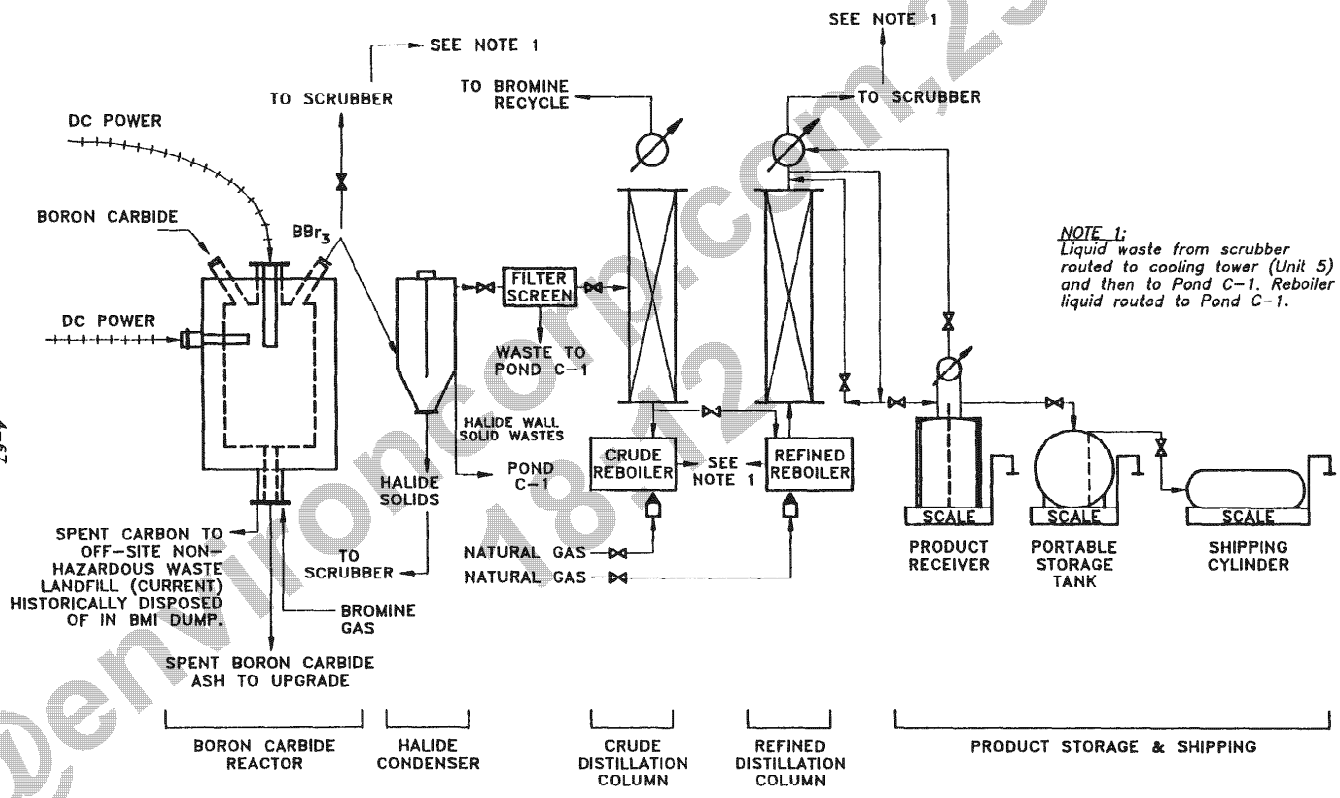

FIGURE 4.12.1
BORON TRIBROMIDE PROCESS FLOW DIAGRAM

Modified after flow diagram provided by KMCC. Reference DOC #K257, K39, K117.

31-135909-004

4.13 Steam Plant Process

4.13.1 General Description

The steam plant is located approximately 1320 feet north of Unit 4. The steam plant provides steam to the entire KMCC Henderson Complex. The users of this steam are the Chlorate, Electrolytic Manganese Dioxide (EMD), Boron, Wastewater Treatment (Vapor Recompression Unit), Ammonium Perchlorate and Steam Plants. The steam is used mainly for process heating and vacuum ejectors. The boiler feed water pumps in the steam plant are driven by steam turbines (Reference K338).

Steam is distributed through two (2) branch headers off the main steam header. One branch feeds the Chlorate, Manganese, Boron, and Wastewater Treatment Plants and the other branch feeds the Ammonium Perchlorate Plant area. The largest steam users are the Electrolyte Manganese Dioxide (EMD) and Ammonium Perchlorate Plants, which normally consume approximately 86 percent of the entire steam demand. The Steam Plant uses approximately 6 to 7 percent of the total steam internally for its own process. The branch header feeding the Chlorate, Manganese, Boron, and Wastewater Treatment Plants (Vapor Recompression Unit) is cross-tied with a feed header from the Pioneer Chlor Alkali Steam Plant. This cross-tie allows these areas to operate when steam is not available from the KMCC Steam Plant (Reference K338).

4.13.2 Raw Materials Used

The following raw materials are used at the steam plant to condition the water, remove impurities, and/or produce steam (Reference K338, CA017):

- water;
- natural gas;
- fuel oil;
- lime or NaOH;
- caustic;
- coagulant;
- sodium sulfite (Nalco 1720);
- a chelant (Nalco 1745); and
- anti-foam (Nalco 750).

4.13.3 Production Process Flow Description

The Steam Plant has five process areas. These are the Water Softening, Chemical Treatment, Steam Generation, Effluents Collection, and Utilities areas. These areas are described below.

Steam Generation Area

Three boilers are used to generate steam in the Steam Plant. They receive feed water from a common header and discharge steam into a common header. Boilers No. 1 and 2 are set up to burn either natural gas or fuel oil whereas Boiler No. 3 burns natural gas only (Reference K338).

Effluent Collection Area

Effluents from the Steam Plant are processed through the Wastewater Treatment Plant (Vapor Recompression Unit). The effluents involved are the boiler blowdowns, the backwash and regeneration water from the secondary and A.P. water softeners, the sludge bed blowdown from the hot process softener, and miscellaneous pump seal flushes. These are collected in the Effluents Tank and pumped into the wastewater feed header which is routed to the wastewater surge/settling ponds (WC-1 and WC-2). From there, wastewaters are pumped up to the Vapor Recompression Unit for water recovery. Total effluents from the Wastewater Treatment Plant (Vapor Recompression Unit) average 5-10 gallons per minute which is discharged back to WC-1 and WC-2 (Reference K338).

Utilities Areas

Air is supplied to the plant from a compressor that also provides air to the A.P. Plant. Electrical power is supplied from two separate feeder lines. This allows a switch over if one feeder is lost to keep the plant generating. Natural gas is supplied from a Southwest Gas header. Feed water comes from three sources. The main source comes in from the facility raw water loop. Water is also obtained from the return of condensed steam and from distillate from the Vapor Recompression Unit. Condensate return is usually about 50 percent of the feed water requirement (Reference K338).

Water Softening Area

The boiler feed water must be de-aerated to remove dissolved oxygen and must be softened to remove dissolved constituents such as calcium and magnesium (Reference K338).

Softening is accomplished in two stages. The first is hot process softening which is conducted in a single vessel. In its upper section, steam heats the feed water and a caustic and coagulant are added. The resulting changes in temperature and alkalinity cause calcium and magnesium solids to precipitate out. The coagulant added helps the solids agglomerate thus aiding settling and stabilizing of the bed solids. The bed solids act as seed particles helping more solids to precipitate. After the water exits the bed, it is scrubbed with steam in a de-aerator section to remove dissolved oxygen. The de-aerated water then flows on to the second stage of treatment (Reference K338).

Following the hot process softener is a zeolite secondary softener which further removes dissolved constituents by absorption on an ion exchange resin bed. This softener typically reduces the total hardness to less than 1 ppm (Reference K338).

Chemical Treatment Area

Some chemical treatment is also required beyond softening and deoxygenation. Sodium sulfite (Nalco 1720) is added to the feed water as it leaves the hot process softener to remove the last traces of oxygen. A chelant (Nalco 1745) is also added to serve as a dispersant which ties up the remaining solids so they cannot deposit as scale in the steam drum. The dispersant is added along with an anti-foam (Nalco 750) just after the Zeolite Softeners. A small bleed stream is blown down off the boilers to keep the solids within a range for which the treatment chemicals will remain effective (Reference K338).

4.13.4 Waste Stream Characterization

Wastes associated with the steam plant operations result from the following activities (Reference K031, K117, K338):

- o boiler blowdowns;
- o backwash and regeneration water from the secondary and A.P. softeners;

- sludge bed blowdown from the hot process softener;
- brine from vapor recompression unit; and
- miscellaneous pump seal flushes.

These wastewater streams were historically routed to surface impoundment C-1 (Reference K031, K117, K158A). The wastewater contains elevated concentrations of sodium, calcium, and magnesium (Reference K158A, K338). Since approximately 1989, this wastewater has been routed to surface impoundments WC-1 and/or WC-2. This wastewater is then processed through a Vapor Recompression Unit to produce clean water for cooling and process use (Reference K305, K320).

CHAPTER 5.0
SWMUs

5.0 WASTE MANAGEMENT UNITS AND AREAS

General

This section addresses Solid Waste Management Units (SWMUs) identified during document review and site reconnaissance activities. Thirty-one (31) SWMUs were identified and their characteristics are presented in the following subsections. Each subsection provides the following information:

- o unit/area design and operational history;
- o unit/area waste characteristics;
- o regulatory status of unit;
- o waste constituent migration pathways;
- o evidence of releases and potential environmental impacts; and
- o analysis of release prevention or mitigation measures.

An index (listing) of the 31 SWMUs identified during this assessment is provided in Appendix D.

5.1 "Process Hardware" Storage Area Between Units 1 and 2

5.1.1 Unit/Area Design and Operational History

The process hardware storage area (SWMU KMCC-001) is located on the east side of the asphalt and concrete paved area between Units 1 and 2. This storage area abuts the west side of Unit 2 and extends from a line approximately even with the southerly building boundary to the building wall north of the area (Reference Map 1). The area is approximately 210 feet long (north-south) by 50 feet wide (east-west) and is within the fenced and guarded KMCC facility (Reference K161). The area is flat, with a slight drainage gradient to the west and south towards a storm drain in the center of Sixth Street.

This area has been used to store process hardware since November 1989. Use of SWMU KMCC-001 probably began in approximately 1980, when Kerr-McGee began

to review its material disposal options in relation to appropriate solid waste requirements. Specific area use was not documented prior to 1989 (Reference K357). The process "hardware" delivered to this storage area consists of scrap metal parts and equipment from the decommissioning of the former sodium chlorate process in Units 4 and 5. Parts, tanks, and other equipment destined for this area are rinsed or otherwise decontaminated prior to delivery. The parts are temporarily stored in this area until sold as scrap metal (Reference K357).

This SWMU was reviewed during a site reconnaissance (SR) on August 19, 1991. On that day, only one titanium tank was present and the storage area exhibited signs of good housekeeping practices. Both the stored tank and the storage area did not appear to have residual process materials. The asphalt and concrete surfaces appeared weathered and showed signs of cracking and deterioration associated with age. The following features were noted within this SWMU:

- o seams were present between the asphalt and concrete and within the concrete area;
- o a soil-filled metal frame was present flush with surface grade and located approximately 12 feet west of the west wall of Unit 2 and 10 feet south of the northern edge of the concrete. This feature may represent a former drain or sump;
- o a diamond plate covered feature was observed flush with surface grade due east of the soil-filled metal frame and against the west wall of Unit 2;
- o a diamond plate covered feature was observed flush with surface grade approximately 12 feet north of the northern edge of the concrete pad and in the corner against the Unit 2 wall; and
- o a relatively small amount of sodium chloride had overflowed from a Unit 2 door onto the storage area surface. Sodium chloride is a raw material used in the chlorate process and is stored within Unit 2.

5.1.2 Unit/Area Waste Characteristics

The specific waste at this location is cleaned scrap equipment comprised of steel, titanium, brass, copper, stainless steel, and/or other various common metals. The scrap is classified as nonhazardous solid industrial waste destined for recycling.

5.1.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. This SWMU appeared to be operated in conformance with appropriate operating practices for nonhazardous solid waste destined for recycling.

5.1.4 Waste Constituent Migration Pathways

The scrap equipment is rinsed or otherwise decontaminated prior to delivery to this storage area; therefore, the possibility for residual hazardous constituents to migrate and impact the surrounding environment is unlikely.

5.1.5 Evidence of Releases and Potential Environmental Impacts

Indications of releases from this SWMU were not evident during the August 19, 1991 SR. Documentation of historic releases from this SWMU was not found during this study.

5.1.6 Analysis of Release Prevention or Mitigation Measures

Because the scrap equipment is rinsed or otherwise decontaminated prior to delivery to this storage area, the concentration of residual hazardous constituents would be low, if detectable. Releases of residual hazardous constituents from cleaned scrap equipment should not have a measurable environmental impact.

5.2 Trash Storage Area North of Units 1 and 2

5.2.1 Unit/Area Design and Operational History

The trash storage area north of Units 1 and 2 (SWMU KMCC-002) is comprised of two asphalt surfaced areas separated by Sixth Street, a 20-foot-wide asphalt road (Reference Map 2). The eastern storage area is approximately 65 by 100 feet and the western storage area is approximately 65 by 50 feet. These storage areas are located within the fenced and guarded KMCC facility and appear capable of holding more than 2,000 drums (Reference SR, August 19, 1991).

This SWMU has been in use since approximately March 1980 following closure of the BMI Landfill. Common trash from the sodium chlorate and sodium perchlorate

process areas are segregated, delivered to this storage area in 55-gallon drums, and inspected prior to disposal. The drums are sealed, labeled as nonhazardous waste, and shipped to the U.S. Ecology, Inc. Landfill in Beatty, Nevada. Disposal in the Beatty landfill is precautionary because a fire hazard may occur if the common trash is contaminated with sufficient chlorates or perchlorates from the production area (Reference K357).

An SR was conducted on August 19, 1991. On this day, only the eastern storage area was being utilized. Thirty-three, 55-gallon drums were neatly arranged on the eastern storage pad. Several drums were placed on the soil adjacent to the asphalt. Thirty of the drums had lids securely in place. One closed bag of Tyveks was observed on the asphalt adjacent to the drums.

The asphalt surfaces appeared weathered and showed signs of cracking and deterioration associated with age. Neither of these storage areas were equipped with berms or other run-on/run-off control features. Surface water run-on to this SWMU could occur from the very slightly elevated soils in the area to the east of the two storage areas. Run-off from this SWMU would flow into a storm drain to the north of this area in the center of Sixth Street and ultimately drain to the Beta Ditch through NPDES monitoring equipment (Reference K178).

5.2.2 Unit/Area Waste Characteristics

The stored wastes are composed of domestic trash such as paper, Tyveks, gloves and other items which may have been contaminated with chlorates or perchlorates from within process areas. These wastes are received and stored in sealable 55-gallon drums.

5.2.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. This SWMU appeared to be operated in conformance with good operating practices for the nonhazardous industrial solid waste.

5.2.4 Waste Constituent Migration Pathways

Good housekeeping practices were observed at this SWMU during an August 19, 1991 SR. Because only trace concentrations of residual process materials might be present, these would be insufficient to provide a source for environmental impact.

5.2.5 Evidence of Releases and Potential Environmental Impacts

Indications of releases from this SWMU were not evident during the August 19, 1991 SR.

5.2.6 Analysis of Release Prevention or Mitigation Measures

The method of release prevention used by KMCC is the containerization of trash before delivery to this storage area. The present good housekeeping practices reduce the possibility for trace amounts of chlorates and perchlorates to accumulate on the asphalt surface or migrate into the environment.

5.3 PCB Storage Area - Unit 2

5.3.1 Unit/Area Design and Operational History

The polychlorinated biphenyl (PCB) storage area (SWMU KMCC-003) is located within the northern portions of Unit 2 within the fenced and guarded KMCC facility (Reference Map 3). This storage area consists of three, approximately 12 foot by 15 foot vaults with floors that are approximately 12 inches lower than the surrounding area. The concrete vault walls are approximately 8 inches thick. The concrete vault floors are covered with black, 6 mil. plastic sheeting to reduce the possibility of PCB oil spills reaching the concrete floor. Warning signs indicating a PCB storage area are posted outside the door of the vaults and other warning signs are posted on the drums and transformers containing PCB materials when these are present (Reference SR, August 19, 1991).

This vault area had been reserved as a PCB storage area since 1978. Documents reflect use of this area for PCB storage since 1980. Transformers containing PCB cooling oils are occasionally transferred to the vaults where the used oil may be drained from the transformers and transferred to 55-gallon drums. Additionally, other wastes containing

PCBs are stored in 55-gallon drums in this area. These wastes include rags, oil sorb, and concrete from maintenance and clean up of PCB containing transformers. The used PCB containing oil and other PCB containing wastes are stored in the vaults until shipped for disposal (Reference K357, K260, K261).

An SR was conducted on August 19, 1991. On the day of the SR, there were no transformers stored in the vaults. Used PCB containing oil and other wastes containing PCBs were stored in drums in the two westernmost vaults. Indications of spills or leaks of oil on the concrete floor or plastic sheeting were not evident. PCB warning signs were observed posted on the outside of the door and on the drums.

Surface run-on to this SWMU is unlikely as the area is indoors and the entrance way floor is slightly elevated compared to the outside surface. Run-off from within the vaults is unlikely due to the location of the SWMU within a building and the sunken floor design.

5.3.2 Unit/Area Waste Characteristics

The specific materials handled in this area are transformers containing polychlorinated biphenyl (PCB) cooling oil, drums of PCB containing waste oil from transformer servicing, and drums of solid waste from maintenance activities (i.e. PCB contaminated rags, oil sorb, and concrete).

The migration and dispersal characteristics of transformer cooling fluid is similar to that of high temperature hydraulic oil. Dispersion of the oil would be by spillage to the surface of the concrete; the migration mechanism would be capillary action.

5.3.3 Regulatory Status of Unit

This SWMU is regulated under 40 CFR Part 761 regarding PCB material generation, inspections, removals, and liquid disposal (Reference K260). KMCC submits annual PCB Inspection Reports to the U.S. EPA and NDEP. Inspection reports were reviewed for the years 1978, 1980, 1988, 1989, and 1990 (Reference K260, K261, UE016, UE021).

The U.S. EPA conducted a TSCA Section 6 PCB inspection on January 24, 1989. With regard to the PCB storage area, the inspection report indicated *"the drums were*

properly stored in an area conforming to the permanent storage requirements. Monthly inspections of all in-service and equipment stored for reuse had been conducted since 1981 (Attachment 5)...Annual documents had been maintained since 1978. They appeared to be in order (Attachment 8)." (Reference UE016).

5.3.4 Waste Constituent Migration Pathways

The potential migration pathway in this area is limited by the plastic sheeting and underlying concrete vault floors and walls. The pathway is restricted to the surface of the concrete except in areas where cracks or open seams may be present. If cracks or open seams are present and PCB containing oil migrated through these openings, migration to soil could occur by capillary action.

5.3.5 Evidence of Releases and Potential Environmental Impacts

Obvious indications of releases from this SWMU were not evident during the August 19, 1991 SR. (Documentation of historic releases from this SWMU was not found during this study.)

5.3.6 Analysis of Release Prevention or Mitigation Measures

The heavy duty concrete construction and the sunken floor design of the vault provides an effective means for containment and control of potential releases to the environment. The use of plastic sheeting as a liner on the surface of the concrete vault floor provides for additional control of potential releases of PCB containing oil. Should a spill occur within the containment area, the plastic sheeting is easily removed and properly disposed, thus limiting impacts to the concrete surfaces.

This SWMU appeared to be operated in accordance with good operating practices and applicable requirements of 40 CFR, Part 761 (Reference UE016; SR, August 19, 1981).

5.4 Hazardous Waste Storage Area North of Unit 2

5.4.1 Unit/Area Design and Operational History

This hazardous waste storage area (SWMU KMCC-004) consists of four segregated storage areas on concrete pads located approximately 40 feet north of Unit 2 and 40

feet west of Seventh Street within the fenced and guarded KMCC facility (Reference Map 4). The overall size of the SWMU is approximately 65 feet by 15 feet. Three of the concrete storage areas are equipped with four-inch high by five-inch thick concrete containment berms. The fourth storage area, located at the northern end of this SWMU, is unbermed and used to store empty drums on pallets. The southern three bermed storage areas are posted with advisory signs designating the type of wastes stored in each area. The waste types stored in these areas are: (1) waste oil and miscellaneous compatible wastes, (2) flammable and miscellaneous compatible wastes, (3) bases and miscellaneous compatible wastes, and (4) acids and miscellaneous compatible wastes. The wastes are delivered to the SWMU in drums and placed in the appropriate area for that type of waste (Reference SR, August 19, 1991).

This storage area was constructed specifically for RCRA compliance, and was in use by 1983. Since the material managed was in drums, construction was believed to be a concrete pad on a crushed rock base. Documents regarding or detailing engineering or construction considerations were not found (Reference K357).

This storage area was observed during an August 19, 1991 SR. At that time, drums were stored within the four storage areas. Waste designation signs were in place and the stored wastes were in the appropriate areas.

The concrete berms and floors of the containment areas had some minor hairline cracks. One seam was observed in the concrete floor of the center bermed unit. This appears to be the seam between the two sections of concrete pad that comprise the overall SWMU. The berms appeared to be poured-in-place and to be an integral part of the floor. The concrete floor generally appeared to be intact, however, pitting was obvious in some areas and some etching of the concrete floor was observed in the area where acid wastes were stored. The SWMU is surrounded by a gravel surface.

Surface water run-on and run-off is controlled by the berms. In the event that more than four inches of storm water would accumulate, run-off from this SWMU would flow to the northeast toward the storm drain at the intersection of Avenue G and Seventh Street. However, this storm drain is bermed by four-inch high berms to reduce the possibility of water-dispersed wastes entering the system. Surface water

run-off entering the storm drain system in this portion of the facility would drain to the Beta Ditch through NPDES monitoring equipment (Reference K178).

5.4.2 Unit/Area Waste Characteristics

The wastes handled at this SWMU consist of used oil, flammable wastes, bases, acids, and miscellaneous compatible wastes. These wastes are stored in 55-gallon drums.

5.4.3 Regulatory Status of Unit

This SWMU would be regulated under 40 CFR Part 265 Subpart I - Use and Management of Containers and Part 262 Subpart C - Pre-Transport Requirements.

During the August 19, 1991 SR, the drums present at this SWMU were observed to be physically segregated from incompatible wastes, and labeled as "hazardous waste". The drums appeared to be in good condition.

5.4.4 Waste Constituent Migration Pathways

If a spill occurred, the potential pathway is the concrete surface within a bermed area. Spill volumes within the bermed area typically would be limited to drum quantities and be contained within the bermed area. If spills occurred and were left uncollected, migration may occur through cracks in the concrete containment pad. Migration to the underlying soil would be possible by capillary action. Spills outside this SWMU would disperse to the gravel and underlying soil (Reference SR, August 19, 1991).

5.4.5 Evidence of Releases and Potential Environmental Impacts

The only observed evidence of releases outside of the bermed area was a small oil stained area (measuring approximately one foot in diameter) south of the waste oil storage area. Other evidence of spills or releases potentially attributable to this SWMU was not observed (Reference SR, August 19, 1991. Documentation of historic releases from this SWMU was not found during this study.

5.4.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed include the containerization of wastes in drums and the storage of these drums within the concrete bermed storage areas. The

containment areas appeared adequate for the number of drums handled by this SWMU. From the orderly manner in which the drums were observed to be stored and the generally good housekeeping of this SWMU, it appears that the release prevention methods are satisfactory.

5.5 Sodium Chlorate Filter Cake Holding Area North of Unit 3

5.5.1 Unit/Area Design and Operational History

This SWMU is a designated hazardous waste drying and storage area (SWMU KMCC-005) located approximately 30 feet north of Unit 3 and 20 feet west of Eighth Street, within the fenced and guarded KMCC facility (Reference Map 5). This SWMU was constructed in June 1991 and replaces a bermed concrete pad which was used for the same purpose since approximately late 1982 (Reference K345). The new drying and storage area was built over the same location as the former drying pad (Reference SR, August 19, 1991). Demolition debris associated with the original concrete pad was disposed of at U.S. Ecology in Beatty, Nevada. The debris consisted of concrete and minor amounts of sub-base and soil and constituted approximately 42 tons of material (Reference K345, K373).

This SWMU is approximately 36 feet long (north-south) and 18 feet wide (east-west) and is constructed of concrete. The concrete floor of the holding area is approximately 18 inches above the surrounding asphalt paved area and slopes toward the rear wall. The three vertical walls of the holding area are constructed of concrete and vary between approximately one and one-half to three feet in height above the holding area floor. Access to the elevated holding area is up a concrete ramp which is the same width as the holding area. The concrete ramp is approximately 20 feet long (Reference K345).

Liquids which drain from the filter cakes held in this SWMU flow to the lower southwest corner and exit the holding area through a pipe and a valve into a 12-inch deep portable plastic containment bin. This containment bin is positioned within a sunken ramped and bermed concrete secondary containment area. A separate ramp

allows access by forklift to remove the portable bin when it is full and recycle the solution to the process (Reference K345; SR, August 19, 1991).

The concrete holding/drying area and the concrete secondary containment area are underlain by an HDPE liner and a leak detection system. The leak detection system consists of a four-inch diameter PVC monitoring pipe which extends to the low point of the liner. The monitoring pipe has a perforated cap at the low end to allow detection and measurement of liquids trapped by the liner (Reference K345; SR, August 19, 1991).

The operating practices in this area consist of transporting damp to wet process filter cakes from the sodium chlorate operations to this SWMU for drying. The entrained solutions in the process filter cakes contain hexavalent chromium. The cakes are placed in this holding area where they are allowed to dry. When the material is dry, it is taken by front-end loader to the hazardous waste storage area between Units 3 and 4 (SWMU KMCC-006) awaiting off-site disposal (Reference SR, August 19, 1991).

An SR was conducted on August 19, 1991. On that day, there was a small amount of filter cake in the holding area. Signs of significant deterioration or cracks were not observed. The holding area appeared adequate in size and appropriately managed for the anticipated amount of filter cake to be stored. A sign and several labels were posted at this SWMU reflecting hazardous waste storage.

Run-off from the unit is controlled by the floor sloping to the back southwest corner where precipitation run-off, as well as liquids from the cakes, flow through a pipe and valve system into a plastic containment bin. Additionally, storm drains in this general area have been retrofitted with four-inch high protective berms to reduce the possibility of water-dispersed wastes entering the system. Surface water run-on is prevented by the elevated design of the holding area. Ponding may occur against the outside concrete walls of the storage area and may enter the secondary containment area because the ramp to this area slopes down toward the plastic containment bin. Water would have to overtop the plastic containment bin and/or exceed the containment capacity to cause a release of solution from the secondary containment area.

5.5.2 Unit/Area Waste Characteristics

The material held in this area is comprised of filter cakes from the sodium chlorate operations. This material contains total chromium, a mixture of hexavalent and trivalent chromium, at concentrations that potentially could be greater than 5.0 mg/L if this material were evaluated by EP Toxicity (EP TOX) testing criteria (Reference K219, UE022). KMCC's manufacturing experience has shown that the filter cake may, at times, contain hexavalent chromium concentrations which would be expected to exceed the RCRA criteria of 5 mg/L (TCLP). KMCC has, therefore, chosen to manage the material as a hazardous waste, and dispose of it accordingly, rather than instituting a testing program for every load to assess the hexavalent chromium concentration. Since January 1990, the filter cakes originate from the mud filter, brine filter, polishing filter, and sulfate filter (Reference K259). Prior to 1990, the filter cakes originated from Sparkler and Durco filters (Reference K253). Documentation was not found regarding testing of this waste by the Toxicity Characteristic Leaching Procedure (TCLP) or EP TOX methods.

5.5.3 Regulatory Status of Unit

KMCC is proceeding with certification of this drying and storage area as a tank system for storage or treatment of hazardous waste in accordance with the facility's generator status. Upon certification and receipt of NDEP concurrence, this SWMU will be managed per 40 CFR Part 265 Subpart J - Tank Systems.

5.5.4 Waste Constituent Migration Pathways

The migration pathways are the concrete surface within the SWMU and the underlying foundation material between the concrete and the HDPE liner which serves as a part of the leak detection system. In the event of the waste spillage outside of the containment area, the migration pathway would be the asphalt and underlying soil which surrounds this area. Surface water run-off is controlled by the sloping design of the concrete floor and the berms surrounding storm drains in this area.

5.5.5 Evidence of Releases and Potential Environmental Impacts

Documentation of historic releases from this area was not found during this study.

During the August 19, 1991 SR, several minor releases of waste material (approximately one inch in diameter) were observed on the asphalt adjacent to the western side of the holding area. The asphalt surrounding this SWMU appeared well maintained and other evidence of releases were not observed.

5.5.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed at this SWMU include the concrete primary and the HDPE secondary containment systems. The leak detection system is monitored on a regular basis and records are maintained at the KMCC offices (Reference K357). The present good housekeeping practices further aid in reducing the possibility of releases of measurable amounts of sodium chlorate filter cake outside of the holding area.

5.6 Hazardous Waste Storage Area Between Units 3 and 4

5.6.1 Unit/Area Design and Operational History

This SWMU (KMCC-006) is a hazardous waste storage area, consisting of an eight-wheeled, semi-dump trailer. This dump trailer receives solid waste from the sodium chlorate process area (including filter cake directly from the sodium chlorate filter press when the moisture content is sufficiently low) and the sodium chlorate filter cake holding area (SWMU KMCC-005). The trailer is located within the fenced and guarded KMCC facility approximately 6 feet west of the western wall and 20 feet south of the northern wall of Unit 4 in the process area between Units 3 and 4 (Reference Map 6). This area is within the sodium chlorate production containment area which is bermed on both the north and south ends. The berms are positioned to retain fluids and solid waste within the production area. These fluids drain to a central sump system and are recycled into the process (Reference; SR, August 19, 1991).

This SWMU has been operating since early 1983 and is presently in use. Solid waste is typically delivered to the trailer by front-end loader. The trailer is hauled off-site to a

commercial hazardous waste disposal site such as U.S. Ecology, Inc. Beatty, Nevada facility (Reference K268; SR, August 19, 1991).

An SR was conducted on August 19, 1991. On that day, the trailer was unlined and contained asphalt rubble which had been removed from a demolition project in the production area. The rubble was being managed as potentially contaminated and was placed in the trailer for disposal as a hazardous waste. The area surrounding the trailer appeared well maintained.

The asphalt surface appeared intact and cracks were not noted in the vicinity of the trailer. Berms were intact and it appeared that water and waste spilled in this area would flow toward the recovery sump where liquids accumulate for recycling into the process. Surface water run-on into this area may occur from either the north or the south if the water is sufficiently deep to overtop the berms. However, run-on would be recovered by the sump system and recycled into the process stream. The containment berms appeared adequate and housekeeping conditions appeared good.

5.6.2 Unit/Area Waste Characteristics

The solid waste managed in this area is comprised of filter cakes from the sodium chlorate operations. This waste contains total chromium, a mixture of hexavalent and trivalent chromium, at concentrations that could be greater than 5.0 ppm if this material were evaluated by EP Toxicity or Toxicity Characteristic Leaching Procedure (TCLP) testing criteria (Reference K219, UE022). KMCC's manufacturing experience has shown that the filter cake may contain hexavalent chromium concentrations in excess of 5 mg/L. KMCC has, therefore, chosen to manage the material as a hazardous waste, and dispose of it accordingly, rather than instituting a testing program for every load to assess the hexavalent chromium concentration. Since January 1990, the filter cakes originate from the mud filter, brine filter, polishing filter, and sulfate filter (Reference K259). Prior to 1990, the filter cakes originated from Sparkler and Durco filters (Reference K253). Documentation was not found regarding testing of this waste by TCLP or EP TOX methods.

Containment of this waste in the lined and covered dump trailer limits the potential for

dispersion. The recycling of washdown water from within the containment area back into the process stream limits the dispersion and migration of waste accidentally spilled in this area.

5.6.3 Regulatory Status of Unit

This SWMU would be regulated under 40 CFR Part 265 Subpart I - Use and Management of Containers and Part 262 Subpart C - Pre-Transport Requirements.

5.6.4 Waste Constituent Migration Pathways

Potential pathways for migration of waste are spillage onto the asphalt surface during transport or loading to the trailer. Spillage in this area would be washed down with water, collected by the process area sump, and recycled into the process stream.

Also, filter cake waste potentially may be spilled outside of the production area during transport to and from the drying area (SWMU KMCC-005). If this type of spillage occurred, the waste would fall on the asphalt area between the two SWMUs and would be cleaned up.

5.6.5 Evidence of Releases and Potential Environmental Impacts

During the August 19, 1991 SR, several small marks of filter cake were noted on the asphalt surface adjacent to the dump trailer and within the containment area. These marks were approximately two to four inches in diameter and appeared dry.

Documentation of historic releases from this SWMU was not found during this study.

5.6.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed at this SWMU include the containerization of solid waste in the lined truck trailer, the secondary containment provided by the bermed and paved production area, and the recycling system. Filter cake which spills outside of the trailer during loading would fall within the containment area where it would be managed by washdown and recycling practices.

Two methods are employed to manage spillage of sodium chlorate solids during transfer to SWMU KMCC-006 from SWMU KMCC-005. First, the operator of the front-end loader does not fill the bucket completely. Second, filter cake which may spill from the bucket is swept up and placed in SWMU KMCC-006, or the spilled material is washed to the area collection sump (and recycled to the process) at the conclusion of the transfer operation (Reference K357).

5.7 Platinum Drying Unit North of Unit 4

5.7.1 Unit/Area Design and Operational History

This SWMU (KMCC-007) is a drying unit for platinum bearing by-product material. The drying unit is located approximately 80 feet north of Unit 4, within the fenced and guarded KMCC facility (Reference Map 7), and consists of an approximate 20 by 32 foot concrete-floored and concrete-bermed containment pad. The berms are approximately seven inches high and six inches thick. The bermed volume of this drying unit is approximately 14 cubic yards. The area is surrounded by metal stanchions and chains to keep traffic out. The area is surrounded by soil on the north, east, south and southwest sides and by concrete on the west and northwest sides.

This drying unit has been in use since 1983 to produce a material suitable for off-site shipment for platinum recovery and recycling. The operating practices consist of delivery of a damp process by-product material from the sodium perchlorate operations to this drying unit prior to off-site recycling. This material originates from sodium perchlorate cell bottoms and the sodium perchlorate filter press. Perchlorate cells are removed from the process line and transported to the SWMU by fork-lift. The cell "bottom" is then washed into the SWMU.

Occasionally, a moist filter cake is generated from the perchlorate filter press and is transported in a filter press hopper by fork-lift to the SWMU (Reference Doc. K347). However, typically, this filter cake is not moist and is placed directly into drums and temporarily stored prior to off-site transport.

After drying, the material is placed into drums, temporarily stored in a covered storage area located under a roof along the south side of the north wall of Unit 4. The drums are shipped as a recyclable material to an off-site precious metal recovery company for recovery of platinum (Reference K335, K336, K337).

This drying unit was in operation during an August 19, 1991 SR. On that date, the drying unit was full of material. The berms appeared intact as did portions of the floor which were exposed by scraping away the sludge. The material had several trenches cut through it to facilitate liquid drainage which aids in the drying process. The soil surrounding this drying unit showed some staining with a white crystalline substance similar to the white crystalline material within the drying unit.

There are no apparent surface water drains within the immediate area of this drying unit. Surface water would enter the surrounding area from the east, flow into or around the drying unit, and flow toward an adjacent topographically lower welding area to the southwest. Surface water entering the welding area may either pond or eventually flow into the adjacent process area (if it overtopped the containment berms) where it would be recovered. There is a storm drain in the middle of Avenue G approximately 80 feet from the drying unit, but it is bermed to prevent water from entering it.

5.7.2 Unit/Area Waste Characteristics

The specific material managed in this drying unit is a sodium perchlorate process by-product which contains recoverable amounts of platinum. This material is classed as a "recyclable material" (Reference UE006). The material contains diatomaceous earth filter media with trace amounts of platinum, chromium, sodium chloride, sodium perchlorate, sodium carbonate, and calcium carbonate (Reference K275, K278). The material is delivered to this drying unit in a semi-wet condition. As the material dries, a crystalline crust forms. This crust is occasionally broken to improve the drying process.

Since 1983, the dried material has been shipped as a hazardous waste or hazardous material due to the presence of sodium perchlorate, an oxidizer (Reference K336,

K337). Prior to 1983, the semi-wet material was burned on-site in enclosed electric drying ovens before being shipped for off-site platinum recovery (Reference K357).

5.7.3 Regulatory Status of Unit

The material is managed following the requirements of 40 CFR, Part 266, Subpart F-Recyclable Material Utilized For Precious Metal Recovery (Reference UE006).

5.7.4 Waste Constituent Migration Pathways

The potential migration pathways include liquids from the material overflowing onto adjacent surface soils and subsequent surface water transport if the unit is overtopped and spills material onto surface soil. The dominant pathway appears to be liquid overflow onto surface soils. Migration to shallow groundwater is unlikely without a continual source of liquid available to transport the waste to groundwater. Migration within the soil and into groundwater would be retarded by adsorption to the soil particles and cation exchange with clay particles.

The operating management practices for this recycling unit are such that measurable amounts of airborne migration are not likely due to the crust which forms during drying. The evaporative drying process causes chloride/chlorate/perchlorate crystalline crust to form on the sludge. This crust reduces the potential for airborne particle dispersion.

5.7.5 Evidence of Releases and Potential Environmental Impacts

Areas of white crystalline staining similar in appearance to those within the containment area were evident on the adjacent soil and concrete to the north, south, and west of the containment area on the day of the SR. The chemical constituents and characteristics of this white material were not evaluated, but the material is suspected to be sodium chloride, sodium chlorate, sodium perchlorate or a mixture of these compounds.

Documentation of historic releases from this SWMU was not found during this PR.

5.7.6 Analysis of Release Prevention or Mitigation Measures

The concrete berms and the concrete floor are the release prevention methods for this drying unit and the material containing valuable platinum. The concrete drying area may not be of adequate size or design for the current use.

5.8 Solid Waste Dumpsters

5.8.1 Unit/Area Design and Operational History

This SWMU (KMCC-008) is a trash and scrap metal collection area. The design features consist of open metal dumpsters placed on sloped, concrete paved surfaces which are separated by areas of gravel covered soil. This SWMU consists of three separate collection areas within the overall SWMU and is located approximately 200 feet east of the entrance guardhouse and just south of the southern limit of Avenue H within the fenced and guarded KMCC facility. The overall area is approximately 220 feet east-west by 70 feet north-south (Reference Map 8). Three different types of waste are handled within the SWMU: the westernmost area is for collection of recyclable scrap steel; the central area is for collection of common paper trash; and the easternmost area is for collection of recyclable stainless steel and non-ferrous metals (Reference SR, August 19, 1991).

This SWMU has been in use since February 29, 1980, and is presently in use. Prior to February 1980, paper trash wastes were burned or buried at the BMI dump (Reference K056). The elevated ramp for the scrap steel area was built in 1984. Operating practices presently in operation remain consistent with those of the past. Scrap steel and metal are washed and rinsed at their area of origin prior to transport to this SWMU. The common waste paper (trash) is periodically wet down to prevent wind dispersion and to reduce fire hazard in the event that some of the paper is contaminated with trace amounts of chlorates or perchlorates (Reference K357).

Observations during the SR on August 19, 1991 indicate good housekeeping and management practices in the area.

5.8.2 Unit/Area Waste Characteristics

The specific wastes delivered to this SWMU are scrap metals, both ferrous and non-ferrous, and common paper trash. Ferrous metals consist of steel and stainless steel, and non-ferrous metals typically consist of copper, brass, and insulated copper wire. The metals originate from various parts of the plant and are washed and rinsed before storage at this SWMU prior to disposal by a metal recycler. The common waste paper originates from the administration building and other areas where such trash is produced. These wastes are classified as nonhazardous solid waste.

Because the scrap material is washed prior to delivery to this SWMU, the concentration of hazardous chemical constituents on scrap steel and scrap metal are low, if present at all. The migration and dispersal potential of the scrap materials is low. The potential for wind dispersal of paper trash is reduced through application of preventive measures including periodic wetting.

5.8.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. This SWMU appeared to be operated in conformance with good operating practices for nonhazardous solid waste.

5.8.4 Waste Constituent Migration Pathways

The potential migration pathways are the air for wind-borne paper trash and the concrete or soil surface for the scrap metal. The potential for migration and dispersal of scrap steel, scrap metal and common waste paper from this area is considered low.

5.8.5 Evidence of Releases and Potential Environmental Impacts

Kleinfelder did not observe releases of contaminants at the site. The pads and surrounding soil were generally free of solid waste or litter (Reference SR, August 19, 1991). Documentation of historic releases from this SWMU was not found during this study.

5.8.6 Analysis of Release Prevention or Mitigation Measures

Due to the nature of the waste handled here, releases would not have a measurable environmental impact. Possible release of paper trash from the common trash dumpster is mitigated by periodically wetting the trash down with water. This also has the advantage of reducing the risk of fire due to possible contamination by flammable substances.

5.9 Manganese Tailings Area

5.9.1 Unit/Area Design and Operational History

The manganese tailings area (SWMU KMCC-009) is located near the eastern central portion of the KMCC property, directly north of the manganese dioxide leach plant and adjacent to the eastern property line (reference Map 9). This area is within the fenced and guarded KMCC facility and includes both the generation area (the tailings filter) and the disposal area (the nonhazardous manganese tailings pile). Manganese tailings have been placed in this area since benefication of manganese dioxide ore was initiated by WECCO in 1951 (Reference K037, K039).

Prior to 1975, tailings from the benefication of manganese dioxide ores were sluiced to unlined surface impoundments/leach beds at the current location of the tailings pile (Reference K037, K039, K056). The sluicing water either evaporated or percolated leaving the solids behind. Filtering of the manganese tailings began in February 1975 and yielded a semi-dry, solid filter cake waste (Reference K056, UE030). Since February 1975, this filter cake (referred to as manganese tailings material) has been landfilled on top of the same area previously used as leach beds (Reference K037, K039).

The manganese tailings are dewatered by a rotating drum filter that processes material from the Leach Plant operation. The dewatered tailings drop onto a concrete pad below the filter. Once enough material has accumulated on the pad, the tailings are transported (typically by front-end loader) to the nearby manganese tailings pile area for disposal (Reference SR, August 19, 1991).

The manganese tailings pile is periodically graded to allow for directed drainage of storm water. The tailings pile is highest along the north-central portion and slopes gently to moderately to the east, south, and west. The northern limit of the tailings pile is marked by an abrupt slope to the north. A storm water run-off diversion ditch is present at the base of the northern limit of the tailings pile. This drainage originates mid-distance along the eastern extent of the tailings pile and extends along the base of the northern limit of the tailings pile to an NPDES monitoring point (outfall #003) near the northwest corner of the tailings area. Another drainage along the western extent of the tailings area meets the aforementioned diversion drainage at this NPDES monitoring point (Reference SR, August 19, 1991).

An SR of the SWMU was conducted on August 19, 1991. On that day, the tailings pile appeared recently graded and the area appeared well maintained.

5.9.2 Unit/Area Waste Characteristics

The manganese tailings deposited in this area arrive as a semi-dry solid filter cake. This cake contains manganese dioxide ore tailings which are acid insoluble, and also contain trace heavy metal sulfides, silica, paraffin wax and calcium sulfate (Reference K037, K137). The tailings were analyzed by EP Toxicity testing procedures in 1979 and 1985 and by TCLP methods in 1990. Analytical results from both methods reveal nonhazardous concentrations of the eight heavy metals evaluated by these tests. KMCC has classified this benefication waste material as nonhazardous (Reference K147, K179, K264, K319, UE065).

Dispersion characteristics of the tailings material are controlled chiefly by moisture content. If the tailings become sufficiently dry, winds can transport this material. If the tailings become sufficiently wet, either by precipitation or surface water run-on to this area, the tailings material can be dispersed along the drainage channels. Leachate generation and migration to the underlying soils and eventually to the near surface groundwater may occur with sufficient precipitation or surface water run-on and time.

5.9.3 Regulatory Status of Unit

Disposal of manganese tailing is regulated by the NDEP. KMCC operates the manganese tailings pile under a May 15, 1985 authorization from the NDEP (Reference

K147, K343). This authorization approved the opening of the manganese dioxide solid waste landfill. The approval was based on Kerr-McGee's requests of September 24, 1984 and March 7, 1985 (Reference K111) which detailed the proposed location, materials to be landfilled, and included an EP TOX analysis of manganese dioxide tailings. The NDEP authorization for this waste pile allows the co-disposal of some demolition debris from the KMCC facility (Reference K111). Discharge of surface water run-off is regulated by KMCC's NPDES permit issued by the NDEP in 1988 (Reference K158A). No citations or violations pertaining to the manganese dioxide waste pile were found during this study.

5.9.4 Waste Constituent Migration Pathways

The migration pathways for manganese tailings includes the air and surface water. Additionally, leachate could form and migrate through soil to groundwater.

Migration via the air pathway occurs by airborne transport of dried particulate matter due to wind. Surface water run-off, as a result of precipitation or surface water run-on, would be intercepted by a diversion ditch on the north and east sides of the landfill, drain through an NPDES monitoring station (Outfall #003), and eventually exit the site via the Beta Ditch. Water which percolates through the tailings area may carry soluble constituents into the underlying soil. Sufficient infiltration, available water, and time would be required to complete the migration pathway to the shallow groundwater. The manganese dioxide tailings have been analyzed by both EP Tox and TCLP methods. Both analyses have demonstrated the nonhazardous nature and low leachability potential of the waste stream. Qualitative evaluation of the total waste stream indicates that calcium sulfate is the only potentially water soluble constituent in appreciable quantities. However, the water solubility of calcium sulfate is rather low. Additionally, neither calcium nor sulfate are hazardous substances.

Disposal of manganese dioxide slurry to leach beds in the same area prior to 1975 depended upon evaporation and percolation for dewatering. In the present system the tails are filtered to remove liquid. Since the tailing's composition is essentially the same then as now, it is assumed the low leaching potential was equivalent and therefore constituents of the tailings pile did not leach with the percolating water.

5.9.5 Evidence of Releases and Potential Environmental Impacts

Dark stained soils north, south, east, and west of this SWMU suggests wind-blown dispersion has occurred. The dark stained soils are apparent for several hundreds of feet north, south, and west of the tailings pile and appear to extend a short distance to the east of the KMCC/Timet property line. Airborne tailing material was observed during an August 19, 1991 SR.

Kleinfelder did not find documentation reflecting groundwater impacts which could be attributed to disposal or leaching of the manganese tailings materials either from the present process or from the previous slurry operation.

5.9.6 Analysis of Release Prevention or Mitigation Measures

Prior to February 1975, the manganese tailings were slurried to leach beds and the water either evaporated or percolated into the soil (Reference K056). The conversion to a dewatered tailings material in February 1975 represents a mitigative measure that would reduce the potential for impacts to groundwater.

Airborne dispersion of particulate matter is somewhat reduced by placing and grading the tailings while moisture content is sufficiently high to reduce dust. Dispersion by surface water run-off is controlled by diversion ditches on the north, east, and west sides of the tailings area. Drainage in this area of the facility is directed away from the tailings area to reduce surface water run-on and divert this around the tailings area. Surface water that exits this SWMU via these diversion ditches would discharge through an NPDES monitoring point just northwest of the tailings area (Reference K158A; SR, August 19, 1991).

A site specific groundwater monitoring system is not in place for the manganese tailings area. Monitoring wells present north and downgradient of this area are used to monitor surface impoundment C-1. The current groundwater monitoring program for SI C-1 and other portions of this facility does not include analyses of heavy metals and other parameters which could be used to evaluate this SWMU.

5.10 Old P-2 Surface Impoundment

5.10.1 Unit/Area Design and Operational History

This pond (SWMU KMCC-010) was a lined process surface impoundment (SI) located approximately 300 feet southwest of the steam plant and within the fenced and guarded KMCC facility (Reference Map 10). This pond had a 12,000 square foot surface area and a 350,000 gallon capacity (Reference K031, UE024). The old P-2 SI was originally constructed in the fall of 1972 with a single layer of polyvinyl chloride (PVC) on the bottom joined to chlorinated polyethylene (CPE) on the side walls (Reference K003, K220, UE024, UE030). Prior to June 1980, the PVC/CPE liner was replaced because these materials were apparently incompatible when in contact with each other and leaks had developed along the seams (Reference UE024). The PVC/CPE single liner was replaced with a nylon reinforced butyl rubber single liner (Reference UE024).

The old P-2 SI was again relined sometime between June 1982 and August 1984 utilizing a double liner system with a surface area of 13,000 square feet and a capacity of 675,000 gallons (Reference K031, K064, K117, K158A, K223, UE024). The bottom was lined with a 30 mil. unreinforced PVC membrane, the side underliner was a polypropylene geotextile with a weight of 400 gm/m^2, and the upper liner was a 36 mil. Polyester reinforced Hypalon membrane (Reference K117, K158A, K167, K223). A second top liner consisting of 60 mil. high density polyethylene (HDPE) was installed between August 1984 and July 1985 because part of the former double liner system had failed (Reference K117, K158A, K167, K223). The old P-2 SI continued to operate until April 1990 when decommissioning was initiated (Reference K220).

The old P-2 SI received sodium chlorate solution from process washdown, excess solution above the handling capacity of the process vessels, storm water from within the process area, caustic scrubber solution from the ammonium perchlorate plant, and solution from cooling tower leaks (Reference K031, K158A, K167, UE024). These solutions were concentrated in the SI through evaporation and then returned to the process where residual sodium chlorate was recovered (Reference K220, UE024).

The old P-2 SI is in the process of clean closure per 40 CFR Part 265, Subpart K. The liner, the solid contents, and adjacent and underlying soil were removed and disposed off-site at the U.S. Ecology, Inc., Beatty, Nevada facility during late June and early July 1990 (Reference K220, K354).

During an August 20, 1991 SR, the former location of the old P-2 SI was observed. The liner system had been removed and the area surrounding the former SI location consisted of exposed soil. Dark colored soil was noted in the western wall of the old P-2 excavation and exhibited stratification indicating the likely presence of manganese tailings from past area use activities (for a discussion of these manganese tailings area, please see Section 5.22). The soil around the SI exhibited a white crusty discoloration. Light colored soils were also observed as patches in the bottom of the excavation at approximately four to five feet below grade.

The amount of surface water run-on that may flow into the excavation is limited because there is a run-on control ditch approximately 15 feet south of and parallel to the southern edge of the SI excavation. This ditch is directly north of the diesel storage frontage road which also parallels the southern portion of this SWMU. There is a drainage ditch to the east of New P-2 access road east of this SWMU which receives or diverts most of the surface water run-off from the surrounding areas.

5.10.2 Unit/Area Waste Characteristics

The former old P-2 SI received chlorate process liquids which contained hexavalent chromium, sodium chloride, sodium chlorate, and sodium perchlorate (Reference K031, K037, K039, CA017, UE024). The latter compound was from the caustic scrubber solution generated at the ammonium perchlorate plant (Reference K031). The soils adjacent to and underlying the former old P-2 SI are potentially contaminated with hexavalent chromium as a result of historic liner leaks (Reference K223, UE024).

5.10.3 Regulatory Status of Unit

Old P-2 SI was one of several process ponds regulated by the NDEP in conjunction with KMCC's NPDES Permit (NV0000078) (Reference K158A). Old Pond P-2 did not receive hazardous waste as classified by RCRA, therefore the SI was not a RCRA

regulated storage facility. This SI is currently undergoing closure in accordance with applicable solid waste rules. The liner and adjacent/underlying soils have been removed and disposed off-site at U.S. Ecology, Inc.'s, Beatty, Nevada facility (Reference K354).

5.10.4 Waste Constituent Migration Pathways

The migration pathways include historic releases of hexavalent chromium bearing liquids to soil and percolation through the soil to potentially impact the shallow groundwater.

5.10.5 Evidence of Releases and Potential Environmental Impacts

A review of documents revealed that the old P-2 SI leaked an unknown quantity of solution on more than one occasion. The original single liner was replaced with a different single liner prior to June 1980 because leaks had developed (Reference UE024). In June 1982, this second single liner failed and approximately 50,000 gallons of solution leaked (Reference K064). This single liner was subsequently replaced with a double liner system sometime between June 1982 and August 1984 (Reference K031, K064, K158A, K223, UE024). A second upper liner was added sometime between August 1984 and July 1985 because part of the original double liner system failed (Reference K117, K158A, K223).

A review of the 1985 Hydrogeological Investigation report prepared by KMCC reveals shallow groundwater north (downgradient) of the old P-2 area (which also included other SIs) exhibited elevated chromium and conductivity values (Reference K167). The 1985 report indicated that the observed impacts in the area were from a major plume that extended north from Units 4 and 5 (Reference K167). The observed groundwater impacts may also be partially related to historic leaks from this SI.

The surficial soils in the vicinity of the old P-2 SI, on the floor of the former SI and around the base of a nearby P-2 pump station exhibited white crystalline discoloration during an August 20, 1991 SR. The chemical constituents comprising this discoloration were not evaluated. Sampling and analyses will be conducted during closure activities to evaluate potential environmental impacts.

5.10.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed at this SWMU included the use of single followed by double liner systems, control of discharge to the SI to avoid overtopping, and periodic pond solution level monitoring to assess potential leaks (Reference K031, K158A, UE024, UE030). Once leaks were indicated through the pond monitoring program or when observation showed the liner was unserviceable, repairs were made or the liner was replaced (Reference K220, K223, UE024).

Removal of the liner and soil from the sides and from beneath the former old P-2 SI are the mitigative measures employed to date for the historic releases. Sampling and analyses during closure will provide additional information which can be used to evaluate the existence and extent of potential impacts created by historic releases.

5.11 C-1 Surface Impoundment

5.11.1 Unit/Area Design and Operational History

This single-lined process wastewater surface impoundment (SWMU KMCC-011) is located near the eastern property boundary, approximately 400 feet north of the manganese tailings pile area, and within the fenced and guarded KMCC facility (Reference Map 11). This SI was constructed in October 1974 using a single layer of PVC on the bottom and reinforced butyl rubber sides (Reference K003, K013, K031, UE024, UE030). The liner fabric is reported to be 60 mil. thick. The C-1 SI has a surface area of 69,000 square feet and an approximate capacity of 3,125,000 gallons (Reference K031, K158A). This SI is used to hold nonhazardous industrial liquid waste for evaporation and is not equipped to recycle the liquids back to the processes (Reference K031, K147, UE024, UE030). Four groundwater monitoring wells monitor the C-1 SI area per an NDEP approved leak detection program (Reference UE057).

The operating practices at this SI consist of receipt of wastewaters from the following activities (Reference K031, K117, K158A, K305):

- o boiler plant blowdown - 2.8 to 8.9 gallons per minute (gpm);
- o boiler plant washdown - episodic;

- o manganese dioxide cathode wash solution - 1.2 to 8.1 gpm;
- o boron neutralization solutions - 0.9 to 1.9 gallons per minute; and
- o hot process water softener solutions - 2.0 gallons per minute.

Historically, the C-1 SI also received approximately 15,000 gallons per day of main cooling tower blow down and filter wash (Reference K031).

The waste stream amount to the C-1 SI has been reduced considerably by the installation of vapor recompression units as part of steam plant modifications in 1989 (Reference K331, K334, K338). Consequently, the water level in the SI has been reduced and there is approximately an additional four feet of freeboard available (Reference K334).

The C-1 SI was observed during an August 20, 1991 SR. The C-1 SI contained a float and sprinkler system used for increasing the evaporation rate. On the day of the SR (August 20, 1991) the sprinkler was not operating because the water level in the SI was so low the intake pumps would take in sludge from the bottom of the SI and plug the system. The C-1 SI was receiving wastewater from the boiler/steam plant blowdown line and the boron neutralization line.

The SI freeboard appeared adequate for the present waste stream inflow and the area was well maintained. The SI side berm tops were flat, approximately 30 feet wide, and well graded allowing access on all sides of the SI.

The four area monitoring wells were observed on August 20, 1991: one is located to the south-southwest (upgradient); one is located directly east (which is lateral-gradient and also used for monitoring the quality of groundwater at the KMCC/Timet property line); and two are located downgradient of the C-1 SI, one directly north of the north side of the SI and one further west.

Surface water run-on may flow into the SI from the surrounding bermed area because the berm grades slightly towards the SI. Because the top of the berm is elevated above the surrounding area on the east, north, and west sides, surface water flowing toward the SI would be diverted around the bermed area to the east and west and into channels that are tributary to the Beta Ditch.

5.11.2 Unit/Area Waste Characteristics

The C-1 SI receives nonhazardous liquid wastes from the activities listed in Section 5.11.1 (Reference K147, K158A). Sampling and analysis of the facilities waste streams are reported to the NDEP annually per the KMCC NPDES permit (Reference K158A). A typical chemical composition for each of the waste streams is listed below in Table 5.11.1.

TABLE 5.11.1

1989 ANNUAL WASTE STREAM ANALYSIS

Pond C-1

	pH	Na	TDS	Ca	Mg	Mn	K
Cathode Wash	5.9	na	14.4	2.2	.368	.00014	na
Neutral Boron	7.8	19.2	179.0	.047	20	na	na
Steam Plant Blowdown	10.2	.195	4.1	.0028	.0010	na	.0051

Units = pH in S.U.; All other units in g/l: "na" indicates no analysis. (Reference K158A)

Constituents in the various waste streams discharged to the C-1 SI are sodium hexametaphosphate, neutralized sulfuric acid, calcium and magnesium hydroxide, and boron neutralization wastewater (Reference K170, K179, UE024). The sodium hexametaphosphate contained in this wastewater is a dispersant and wetting agent. Documentation was not found regarding testing of pond solids by TCLP or EP TOX methods.

5.11.3 Regulatory Status of Unit

This SI is a nonhazardous wastewater holding/evaporation pond which is regulated by the NDEP in conjunction with KMCC's NPDES Discharge Permit (NV0000078) (Reference K020, K158A). KMCC has been monitoring their ponds since the summer

of 1974 (Reference K020) and has monitored the C-1 SI since it was placed in service in late 1974 or 1975 (Reference K158A, UE024, UE030). The NDEP anticipated this SI would be removed from service in 1991 (Reference K158A). KMCC has informed the NDEP that closure of this SI is now planned for 1993 (Reference UE057).

The pond leakage monitoring plan (Reference K060) was approved by the U.S. EPA and became effective August 30, 1975 (Reference K020). Groundwater monitoring is conducted monthly to assess the integrity (check whether the SI has leaked or not) of single-lined SIs. KMCC monitors groundwater in selected groundwater monitoring wells for discrete parameters and constituents. Groundwater analytical results, and a chemical makeup of the process streams and waste streams received by each SI, are reported in monitoring reports submitted to the NDEP (Reference K017, K054, K057, K064, K069, K158A, K305, K320, UE032 through UE057). The results of liquid levels and visual observations are routinely recorded and maintained at KMCC for NDEP review (K357).

The groundwater monitoring program for the C-1 SI includes measurement of pH, conductivity, and sodium chloride (Reference UE057). The current monitoring network consists of monitoring wells M-19, M-22, M-35, M-39 (Reference UE057). Prior to January 1990, the monitoring network consisted of monitoring wells M-18, M-19, and M-22 (Reference UE032 through UE037).

5.11.4 Waste Constituent Migration Pathways

The migration pathways are to immediately surrounding surface soils from surface spills, subsurface soils from a leak in the SI liner, and potentially to shallow groundwater.

5.11.5 Evidence of Releases and Potential Environmental Impacts

Indications of a release from the SI were not observed on the day of the SR. However, the liner exhibited some signs of deterioration. Evidence of a release to the SI was observed during the SR from a pressure relief hole in the steam plant blowdown line.

A small erosion channel had formed and extended from the pressure relief hole to the SI. The point of discharge from the pressure relief hole may be outside of the margin of the C-1 SI liner.

The graphical presentations of groundwater monitoring results for sodium chloride and conductivity in the C-1 monitoring well network were reviewed for the period of August 1985 through December 1989 and July 1990 through November 1991. The sodium chloride and particularly the conductivity graphs showed a trend for the data obtained from MW-22, a monitoring well positioned downgradient and northwest of the C-1 SI. Review of the conductivity values revealed a generalized conductivity trend from approximately 6,000 umhos/cm in 1985 and 1986; through approximately 1,000 umhos/cm in December 1987; to approximately 12,000 to 14,000 umhos/cm in 1990 and 1991. This data indicates a possible source of groundwater impact upgradient of MW-22. However, the source location is difficult to evaluate based on this spatially limited data and the existence of several possible sources upgradient of this monitoring well at locations on both KMCC and Timet property (Reference K167, K305, UE057).

Between February 23, 1979 and March 5, 1979, approximately 840,000 gallons of wastewater were discharged from the C-1 SI to the Beta Ditch and on to the BMI ponds. This action was conducted to prevent damage to the C-1 SI and was reported to the NDEP (Reference K032).

5.11.6 Analysis of Release Prevention or Mitigation Measures

Release prevention relies on the integrity of the liner and control of discharge to the SI. Groundwater monitoring using the monitoring well network in the vicinity of this SI serves to assess liner integrity. The revised monitoring network approved by the NDEP in July 1990 appears to be improved compared to the former monitoring well network (Reference K158A).

5.12 Mn-1 Surface Impoundment

5.12.1 Unit/Area Design and Operational History

This double-lined wastewater surface impoundment (SWMU KMCC-012) is located near the eastern property boundary, approximately 200 feet north of the manganese

tailings pile area, and within the fenced and guarded KMCC facility (Reference Map 12). The Mn-1 SI was placed into operation in May 1983 (Reference K357). The double liner system is comprised of a bottom liner constructed of four to six inches of compacted bentonite clay with a permeability of 10^{-8} centimeters per second; a side underliner of polypropylene geotextile with a weight of 400 gm/m^2; and a top liner of 60 mil. HDPE (Reference K117, K147, K158A). A leak detection piping system is in place between the two liners. The Mn-1 SI has a surface area of 53,000 square feet and a capacity of 3,500,000 gallons (Reference K117, K147, K158A). This SI is used to hold nonhazardous liquid waste for evaporation and is not equipped to recycle the liquids back to the process (Reference K117, K147, K158A).

The present operating practices consist of receipt of nonhazardous wastewater piped from the manganese dioxide process area in Unit 6 (Reference K147). The wastewater is comprised of manganese dioxide cell feed filter waste and potassium phosphate cathode wash solution (Reference K117, K147, K158A).

Historically, this SI also received calcine belt filter washwater from the manganese dioxide leach plant where KMCC used to rinse and leach manganese ore to remove soluble potassium. That process was discontinued in September 1989 (Reference K334).

During an August 20, 1991 SR, the Mn-1 SI was receiving water from the cathode wash process line. The SI appeared adequate for the waste stream flow and the area was well maintained. The exposed portion of the liner did not appear to have tears, or other obvious indications of compromise of integrity. Evidence of liquid discharge from the SI was not observed.

The SI side berms were flat, approximately 30 feet wide, graded level, and the tops were approximately six feet above grade. These berms were well graded, provide access to all four sides of the SI, and provided effective surface water run-on control. Surface water run-on toward the SI would be diverted around the bermed area to the east and west and into channels that are tributary to the Beta Ditch.

5.12.2 Unit/Area Waste Characteristics

The nonhazardous liquid wastes received by the Mn-1 SI include manganese dioxide cell feed filter waste and potassium phosphate cathode washwater. This cathode wash waste stream contains calcium, magnesium, manganese from cathode scale, tank mud, cell sludge, sodium hexametaphosphate (a dispersant and wetting agent), and other naturally occurring constituents as described in Section 4.8 (Reference K117, K158A, K269). The wastewater held in this SI contains high TDS resulting in deposition of solids in the SI bottom as solutions evaporate (Reference K146A). Documentation was not found regarding testing of these solids by TCLP or EP TOX methods.

5.12.3 Regulatory Status Unit

This SI is a nonhazardous wastewater holding/evaporation pond regulated in conjunction with KMCC's NPDES Discharge Permit (NV0000078) (Reference K020, K158A). The pond leakage monitoring plan (Reference K060) was approved by the U.S. EPA and became effective August 30, 1975 (Reference K020).

In accordance with the requirements of the permit, KMCC conducts routine visual inspections to assess the status of double-lined SIs. The general chemical analysis of waste streams received by each SI are reported in annual monitoring reports submitted to the NDEP (Reference K158A, K305, K320). Records of routine liquid level checks, leak detection system checks, and visual observations are maintained at KMCC for review by NDEP (K357).

5.12.4 Waste Constituent Migration Pathways

The potential migration pathways are to immediately surrounding surface soils from surface spills, and to subsurface soils from leaks through the secondary liner.

5.12.5 Evidence of Releases and Potential Environmental Impacts

Indications of releases of Mn-1 SI liquids were not observed on the date of the SR. Granules of white crystalline material (possibly salts) were observed scattered on the northern SI berm.

The discharge monitoring reports (DMRs) reviewed by Kleinfelder included monthly DMRs from June 1990 through November 1991. These DMRs indicated no fluid was detected between the Mn-1 SI liners (Reference UE041 through UE057). Other documentation of historic releases from this SWMU was not found during this study.

5.12.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods include a double-liner system and control of discharge to the Mn-1 SI to avoid subsurface releases and overfilling of the SI, respectively. The leak detection monitoring system, positioned between the two liners, serves as early warning of a release through the primary (top) liner.

5.13 Hazardous Waste Landfill (Closed)

5.13.1 Unit/Area Design and Operational History

The KMCC hazardous waste landfill (SWMU KMCC-013) consists of one unlined subsurface cell with a maximum capacity of approximately 332,000 cubic feet. The hazardous waste landfill is located within the fenced and guarded KMCC facility near the west central portion of the KMCC property (Reference Map 13). The landfill cell measures approximately 410 feet long by 45 feet wide by 20 feet deep (Reference K108, K147, UE108).

The hazardous waste landfill was constructed in a portion of the area formerly used by the U. S. Government between 1941/1942 and 1944/1945 as one of four "Trade Effluent" settling ponds (Reference Section 5.14 of this report). A review of aerial photography also revealed that this area received material of unknown origin from prior to November 1960 to at least August 1979 (Reference K164).

The hazardous waste landfill operated between February 1980 and January 23, 1983 (Reference K056, K095, K108, K128, K130, K147). This landfill was subsequently closed and capped and is currently under post-closure care as required by a closure/post-closure plan approved by the NDEP on April 16, 1985 (Reference K108, K112, K128, K138, K147).

During operation, wastes were placed in this landfill in truckload size increments (approximately 20 cubic yards) and mixed with equal volumes of soil to solidify. Each lift was compacted to minimize later subsidence. The upper fill was comprised of soil originating from the closure of SI S-1 (Reference K071, K108, K147).

Capping of the hazardous waste landfill occurred between September 6, 1985 and October 17, 1985. A multi-layered cover system was installed by Espy Brothers and Serrot Corporation. The cover extends approximately five feet laterally beyond the boundary of waste placement and was comprised of: (1) A 1-1/2 to 4 foot thick compacted clay layer (with less than 10^{-7} centimeters/second permeability), (2) a 40-mil. HDPE membrane, (3) a six-inch thick clay layer, and (4) a one-foot thick drainage layer of compacted granular soil. Three settlement monuments were set in the cover and their locations and elevations recorded on October 17, 1985. Observations and field testing were provided by J. H. Kleinfelder and Associates (Reference K128).

This hazardous waste landfill was observed during an August 20, 1991 SR. On that day, the landfill cap was free of obstructions, vehicles, or other objects. The eastern side of the landfill was protected from drive-on traffic by a low berm that extended the length of the landfill. The western side of the landfill was bordered by an access road which paralleled the western property boundary. The area appeared to have been recently graded and was well maintained. Survey monuments for measurement of settlement were in place. Three caution signs were observed at both the north and the south ends of the landfill. The signs displayed: "Authorized Personnel Only", "Hazardous Waste Landfill", and "Do Not Drive on or Disturb Cap".

The surface is graded with a slope towards the east to facilitate drainage and direct surface water run-off away from the landfill area.

5.13.2 Unit/Area Waste Characteristics

The wastes disposed of in the hazardous waste landfill contained chromium in the sodium chlorate and potassium perchlorate process solids (Reference K108). These wastes were placed in the hazardous waste landfill between February 1980 and January 23, 1983 (Reference K056, K095, K108, K130). Waste disposed of in the hazardous waste landfill included the following (Reference K108, K147):

- o approximately 3,000 cubic yards of sodium chlorate filter cakes originating from the sodium chlorate process; and
- o materials from the closure of SI S-1 which included the liners, an unknown quantity of solids (the solid contents of the SI), and approximately 2,900 cubic yards of chromium contaminated soil.

The sodium chlorate filter cakes consisted chiefly of diatomaceous earth with carbon; calcium sulfate; sodium carbonate; calcium carbonate; soluble salts including NaC1 and $NaC1O_3$; and 0.05 to 1 percent hexavalent chromium. Materials containing hexavalent chromium were managed as hazardous waste (Reference K037, K056, K219, K278, CA017) (Reference K147)

5.13.3 Regulatory Status of Unit

KMCC submitted a closure plan for the hazardous waste landfill to the NDEP on January 21, 1983 (Reference K071). Following incorporation of comments at the request of the NDEP, a revised closure plan was submitted on October 26, 1984 (Reference K108, K130). The revised closure plan was approved by the NDEP in a letter dated April 16, 1985 following the public comment period (Reference K112).

Closure of the hazardous waste landfill was conducted under 40 CFR Part 265 interim status standards and the approval of the NDEP (Reference UE131). Closure included installation of a multi-layered cover system comprised of low permeability compacted clay, a synthetic membrane, and compacted granular soil (Reference Section 5.13.1 of this report). J. H. Kleinfelder and Associates provided observation and field testing services during cover construction. Closure groundwater monitoring requirements included monthly recording of groundwater levels and analysis for chromium, as well as semi-annual analysis for pH, EC, TOC, TOH, chromium, chloride, sodium, sulfate, iron, manganese, and phenols. Based on the information provided by KMCC, field observations, and field testing, a professional opinion was rendered that the hazardous waste landfill was closed in conformance with the intent of the approved closure/post closure plan (Reference K128). The NDEP subsequently acknowledged closure of the hazardous waste landfill in a letter dated January 17, 1986 (Reference K138).

Because closure entailed in-place capping of hazardous wastes, this landfill remains under the interim status standards of 40 CFR Part 265 (Reference UE131). As such,

the NDEP requested KMCC initiate and continue post-closure activities in accordance with the approved closure/post-closure plan (Reference K138). The required post-closure activities include periodic inspection and maintenance of the cap, annual elevation check of the settlement benchmarks, and periodic groundwater monitoring (Reference K108, K128, K147). The groundwater monitoring parameters required for the post closure period were reduced to: pH, EC, TOC, TOH, and Cr and groundwater level (Reference Doc. # K108).

Quarterly groundwater monitoring of the shallow groundwater was initiated in October, 1982 using the four monitoring wells surrounding the hazardous waste landfill (i.e. M-5, M-6, M-7, and H-28). In December 1988, the NDEP approved reduction in sampling frequency to an annual basis because chromium, the constituent of concern, had not been detected (Reference K179).

5.13.4 Waste Constituent Migration Pathways

During the operational life of this landfill the waste migration pathways would have included the air, soil, surface water, and groundwater. Dry soil and/or solids could have become airborne during mixing and landfilling operations. Additionally, wastes could have migrated into the underlying and adjacent soil as a result of infiltration from precipitation events.

The migration pathways have been reduced significantly through installation of the multi-layered cover in September and October 1985. The cover limits migration of waste to the air and surface water and also serves as a barrier to infiltration of precipitation.

5.13.5 Evidence of Releases and Potential Environmental Impacts

Kleinfelder did not find documentation of releases occurring during the operational life of the hazardous waste landfill (February 1980 through January 23, 1983) or during the closure/post-closure period. Evidence of releases from this landfill were not observed during the August 20, 1991 SR.

Groundwater monitoring of four monitoring wells in the vicinity of the hazardous waste landfill has been conducted since October 1982. The results of this monitoring has not

detected the presence of chromium in shallow groundwater at concentrations greater than the detection limits (Reference K058, K066, K068, K077, K092, K106, K126, K146B, K153, K155, K158, K169, K179).

5.13.6 Analysis of Release Prevention or Mitigation Measures

Methods of release prevention employed during the operational life of the hazardous waste landfill included (Reference K108):

- mixing of wastes (which were routinely in the form of a damp filter cake) with equal volumes of soil to solidify; and
- compacting the stabilized material in lifts.

After waste placement ceased (prior to January 23, 1983) and the closure plan was approved, an engineered cover system was installed in September and October 1985 (Reference K128). This multi-layered cover was designed to serve as the primary method of release prevention and prevent storm water infiltration. The cover appears to function adequately for directing water from the area thus reducing surface water infiltration, and significantly reducing the potential for releases. Groundwater monitoring conducted in the vicinity of the hazardous waste landfill has not detected chromium in shallow groundwater downgradient of this SWMU (Reference K058, K066, K068, K077, K092, K106, K126, K146B, K153, K155, K158, K169, K179).

5.14 Trade Effluent Settling Ponds (U.S. Government Operations)

5.14.1 Unit/Area Design and Operational History

The following paragraphs present information related to U.S. Government operation of four "Trade Effluent" settling ponds. These ponds extend onto both the BMI common areas and KMCC property. Information presented here regards use of the portions of this area which occur on KMCC property and are designated as SWMU KMCC-014.

The historic "Trade Effluent" settling ponds are located near the north central portion of the BMI complex. The original system was termed "Trade Effluent" disposal system and was comprised of four surface impoundments and a distribution pipeline. Each settling pond had an area of approximately 20 acres and an average liquid level depth of 7-1/2 feet (Reference UL020).

The settling ponds were formed by construction of earthen dikes around the northern, eastern, and western sides. A dike was not necessary along the southern side because the impoundments were constructed on an alluvial fan which slopes to the north. A french drain system was also incorporated into the design (Reference K161, GM001, GM002).

Wastes were conveyed by the acid drain system and absorber drain system to an acid neutralization plant (Reference K163, K164, UL020, N009). The distribution pipeline then conveyed these wastes from the acid effluent neutralization plant to the settling ponds (Reference K163. GM001). Initially, the acid waste was neutralized with waste caustic liquor prior to discharge to the settling ponds (Reference UL020). This neutralization practice was abandoned when the caustic line disintegrated (Reference UL020).

The actual dates of Trade Effluent settling pond operations are not known. Based on the reviewed literature, these ponds probably began receiving wastes when operations started in the fall of 1942 and may have been used until the magnesium plant was closed on November 15, 1944 (Reference UL001). Use of these ponds for management of liquid waste after November 15, 1944 is not known.

SWMU KMCC-014 is defined as the portion of the Trade Effluent settling ponds which occur on KMCC property (Reference Map 14). This SWMU extends from the northern limits of the french drain system located north of the northern settling pond containment dike/berm to the limit of waste placement along the south side; and from the western KMCC property boundary to the easternmost containment dike/berm (Reference K056, K161, K164). Therefore, approximately two and one fifth of the original four settling ponds are located within the fenced and guarded KMCC property.

After use of these settling ponds by the U.S. Government operations ceased, SWMU-014 also received facility solid materials/wastes at various times between 1945 and 1979. A review of 1950, 1960, 1969, and 1979 aerial photography confirmed that portions of this area received solid materials/wastes (Reference K164). Portions of the southern extent of the former settling ponds were converted to AP storage areas by approximately 1953 (Reference aerial photograph at the BMI office). It is possible that the solid materials/wastes observed in the 1960 photography were either fill, or excavated wastes or soils which were relocated during construction of the AP storage areas.

The majority of this SWMU apparently remained relatively inactive until the 1980s. Between February 1980 and January 1983, the KMCC hazardous waste landfill was constructed and operated in the western portion of this area (Reference K056, K108, K147, K164; SWMU KMCC-013). This landfill was closed and a multi-layered cover system was subsequently constructed over this landfill in September and October 1985 (Reference K128). In approximately October 1988, surface impoundments WC-1 and WC-2 were constructed in the northeastern portion of this area (Reference K342; SWMU KMCC-015 and -016). Additionally, material was borrowed from portions of this SWMU area between August 1979 and July 1987 (Reference K161, K164).

Descriptions of SWMU KMCC -013, -015, and -016 are provided in Sections 5.13, 5.15, and 5.16 of this report.

Portions of SWMU (KMCC-014) were observed during an August 20, 1991 SR. During the SR, activity was not observed in the unoccupied portions of this SWMU. The area was clear of litter, equipment, and other materials indicative of present or recent use for storage. Portions of the historic dikes were present and appeared to help

restrict access to this SWMU. The soil appeared to have been graded or excavated at some areas within this SWMU. At these locations, gray colored soil or waste was exposed. This material appeared to be an indicator of the historic waste disposal operations (Reference K164).

Surface water run-on would flow into this SWMU from the east, south and west. This area would act as a retention basin. Due to the presence of berms on the north and east, run-off from this SWMU would not occur.

5.14.2 Unit/Area Waste Characteristics

The chemical composition of the liquid waste discharged to the Trade Effluent settling ponds during U.S. Government operations is unknown. This waste included both acid and caustic process liquors (Reference UL020). The acid liquor was comprised of hydrochloric acid generated from primary and secondary scrubbing towers which washed chlorinator exhaust gases in the chlorination portion of the "metal units" (Reference UL020). The caustic waste was generated from absorber towers installed to remove the last traces of chlorine and hydrochloric acid passing the primary and secondary scrubbing towers. The absorber towers used waste caustic liquor from the chlorine plant for this purpose (Reference UL020). The waste caustic solution is presumed to be sodium hydroxide (Reference K037).

The nature of solid materials/wastes placed within this area at various times between 1945 and 1979 is unknown. This material may have been solids generated during neutralization of wastes discharged to these ponds or fill added to adjust the grade of the area.

Portions of exposed parts of the former settling ponds exhibited a light colored surface in the 1960, 1969, and 1979 aerial photography (Reference K164). Additionally, darker gray colored material was observed during the SR in a shallow excavation on the western portion of this SWMU. Kleinfelder did not find documentation regarding the chemical characteristics of this material.

Prior to construction of WC-1 and WC-2 within the former Trade Effluent settling pond area, soil samples were collected from two areas and analyzed by EP Toxicity procedures. Two near surface soil samples were analyzed for the presence of six

organic compounds. Nine soil samples, collected between one and sixteen feet below grade, were analyzed for the presence of eight RCRA metals. Each analyte (except barium) was reported at non-detectable concentrations in each sample. Barium was reported at concentrations ranging between 0.1 and 1.0 mg/L. The soil pH was reported to range between 6.5 and 8.4 units (Reference K 353).

5.14.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. The liquid effluent discharges to this area during U.S. Government operations were probably not specifically regulated.

The regulatory status of other SWMUs located in this area (SWMU KMCC -013, -015, and -016) are presented in applicable sections of this report.

5.14.4 Waste Constituent Migration Pathways

During the operational life of these settling ponds, the migration pathways would have included air, soil, and groundwater. These pathways could have been involved with waste migration after 1945 especially when the surficial material was disturbed or a significant precipitation event occurred.

Air releases could have occurred if contaminated particles became airborne. Airborne releases most likely occurred when heavy equipment operated in this area for:

- the construction of the AP storage area in the early 1950s;
- the construction, use and closure of the hazardous waste landfill between February 1980 and late 1985; and
- the construction of WC-1 and WC-2 in late 1988.

Air releases can continue to occur in areas where the waste is exposed at the surface.

Releases to the soil occurred historically because the settling ponds were not lined. Liquid wastes discharged to these ponds percolated into the underlying soil and groundwater.

5.14.5 Evidence of Releases and Potential Environmental Impacts

Kleinfelder did not find documentation that releases to the air occurred during the operational life of these settling ponds or since their use was terminated.

Historic releases to the soil occurred based on the fact that the settling ponds were not lined. Additionally, review of the April 18, 1943 aerial photography revealed that seepage had occurred along the base of the northern containment dike (Reference K164).

Historic releases to the groundwater occurred because these settling ponds were not lined and wastewater seeped into the near surface coarse alluvium. Residents of Pittman were confronted with rising groundwater conditions which caused flooding of basements and cesspools in 1943 and 1944. The shallow groundwater table near the center of Pittman dropped approximately 11 feet within 2 years after two of these settling ponds were abandoned (Reference UB003).

5.14.6 Analysis of Release Prevention or Mitigation Measures

Historic surface release prevention measures associated with the Trade Effluent settling ponds appear to be limited to the construction of containment dikes to confine disposal to a defined area. Because the settling ponds were constructed without liners, liquid wastes discharged to these ponds percolated into the underlying soil and probably into groundwater. Additionally, air releases could have occurred after use of the settling ponds was terminated and the residual wastes dried.

Construction of the AP storage area over a portion of the southern part of this SWMU, the hazardous waste landfill along the western portion of this area, and WC-1 and WC-2 SIs near the eastern portion of this area have altered the site layout. Due to the presence of these features, potential releases of former settling pond wastes to the air, soil and groundwater are somewhat reduced.

5.15 WC-1 (WC-West) Surface Impoundment

5.15.1 Unit/Area Design and Operational History

This double-lined wastewater surface impoundment (SWMU KMCC-015) was constructed within the former Trade Effluent settling pond area and is located near the central portion of the fenced and guarded KMCC facility (Reference Map 15). The

double liner system is comprised of a bottom liner constructed of a 40 mil. HDPE membrane; a side liner constructed of a 105 mil. polypropylene geotextile, HDPE drainage netting, and a 40 mil. HDPE membrane; and an upper liner consisting of a 60 mil. HDPE membrane. The SI has a leak detection system between the top and bottom liners. The WC-1 SI has a surface area of 67,600 square feet and a capacity of 12,515,200 gallons. This SI was constructed with soil berms which stand approximately 10 to 12 feet above the surrounding area. The berm area around the SI is approximately 25 feet wide, flat, and relatively level (Reference K158A, K320; SR, August 20, 1991).

The leak detection system is comprised of monitoring pipes and conductivity detectors. Two, four-inch diameter PVC monitoring pipes allow access to the low point of the secondary containment liner. These pipes are equipped with detectors to monitor for leaks through the top liner (Reference K357).

The WC-1 SI was constructed in late 1988, placed into operation in March 1989, and presently is in use (Reference K342; SR, August 20, 1991). This SI receives a composite liquid waste stream from Units 3, 5, and 6 and the steam plant (Reference K158A). The solutions flowing to this SI are from the following sources (Reference K158A):

- process water softeners;
- steam generation blowdown;
- cooling tower blowdown from Units 3 and 5;
- manganese dioxide product wash solution from Unit 6;
- manganese dioxide cathode wash solution;
- process seal water/filter flush; and
- concentrated brine from the vapor recompression units.

Solution from this SI is then processed through vapor recompression units to reclaim water for cooling and process use (Reference K158A). The concentrated brine effluent from the vapor recompression unit is discharged to either the WC-1 or WC-2 SI.

This SI was observed during an August 20, 1991 SR. On that date, the WC-1 SI had approximately five feet of freeboard. The SI was surrounded by a flat and relatively level berm approximately 25 feet wide and 10 to 12 feet higher than the surrounding

area. The rolled edge of the liner appeared to act as a small berm to reduce run-on into the SI. Precipitation may cause minimal inflow from the top of the berms or the liner surface. Surface water run-on from the south would be diverted around the SI by the berms. Surface water run-off should be minimal from the top of the berms.

5.15.2 Unit/Area Waste Characteristics

This SWMU receives wastewater from Units 3, 5, and 6 and the steam plant (Reference K158A). This wastewater originates from the following sources: process water softeners; steam generation blowdown; cooling tower blowdown from Units 3 and 5; manganese dioxide product wash solution from the clarifier in Unit 6; process seal water/filter flush; and concentrated brine from the vapor recompression units (Reference K158A).

Sampling and analysis of the facilities waste streams are reported to the NDEP annually per the KMCC NPDES permit (Reference K158A). The chemical composition and average flow rate for waste streams directed to the WC-1 SI for 1990 are listed below in Table 5.15.1.

Table 5.15.1

1990 Annual Waste Stream Analysis

	pH	Na	TDS	Ca	Mg	Mn	K	Average Flow
Steam Plant Blowdown	9.9	0.36	1.24	0.030	0.018	n/a	0.011	8.9
RCC Composite	7.1	44	134.6	1.0	1.92	0.61	3.46	1.8

Units = pH in S.U., Average Flow in gpm, All other units in g/l, "n/a" indicates no analysis (Reference K305).

This composite waste stream exhibits a pH of approximately 7.1 to 10.2 (Reference K158A, K305, K320).

Prior to construction of WC-1 and WC-2 within the former Trade Effluent settling pond area, soil samples were collected from two areas and analyzed by EP Toxicity procedures. Two near surface soil samples were analyzed for the presence of six

organic compounds. Nine soil samples collected, between one and sixteen feet below grade, were analyzed for the presence of eight RCRA metals. Each analyte (except barium) was reported at non-detectable concentrations in each sample. Barium was reported at concentrations ranging between 0.1 and 1.0 mg/L. The soil pH was reported to range between 6.5 and 8.4 units (Reference K 353).

5.15.3 Regulatory Status of Unit

This SI is a wastewater holding pond which is regulated by the NDEP in conjunction with KMCC's NPDES Discharge Permit (NV0000078) (Reference K020, K158A). KMCC has been monitoring the WC-1 SI since it was placed into operation in March 1989 (Reference K342, UE041-UE057).

In accordance with the requirements of the discharge permit, KMCC conducts a series of visual inspections to assess the status of double-lined SIs. The general chemical analyses of waste streams and a description of the waste streams received by each SI are reported in annual monitoring reports submitted to the NDEP (Reference K158A, K305, K320). Records of routine liquid level and visual observations are maintained at KMCC for review by NDEP (Reference K357).

5.15.4 Waste Constituent Migration Pathways

The migration pathways are the surface soils in the event of a surface spill, the material between the liners from a leak in the top liner, the subsurface soils from a leak through the secondary liner, and possibly shallow groundwater.

5.15.5 Evidence of Releases and Potential Environmental Impacts

Indications of releases of liquids from the WC-1 SI were not observed during the SR. Indications of small releases were noted adjacent to the east corner of a pump unit which services this SI and the adjacent SI (i.e. WC-2). An area of soil measuring approximately 5 feet by 10 feet appeared white and crusty adjacent to the pump unit. This impact was probably due to pump packing/seal leaks.

The Discharge Monitoring Reports (DMRs) reviewed by Kleinfelder included monthly DMRs from June 1990 through November 1991. These DMRs indicated no fluid was detected between the WC-1 liners (Reference UE041-UE057).

Additional documentation of historic releases from this SWMU was not found during this study.

5.15.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods include a double-liner system equipped with a leak detection monitoring system and control of discharge to the WC-1 SI to avoid subsurface releases and overfilling of the SI, respectively. The leak detection monitoring system, positioned between the two liners, serves as early warning of a release through the primary (top) liner.

5.16 WC-2 (WC-East) Surface Impoundment

5.16.1 Unit/Area Design and Operational History

This triple-lined wastewater surface impoundment (SWMU KMCC-016) was constructed within the former Trade Effluent settling pond area and is located near the east central portion of the fenced and guarded KMCC facility. The triple-liner system is comprised of a bottom liner constructed of a 40 mil. HDPE membrane; a side liner constructed of a 105 mil. polypropylene geotextile, HDPE drainage netting, and a 40 mil. HDPE membrane; a middle liner consisting of a 60 mil. HDPE membrane; and a top liner consisting of a 40 mil. HDPE membrane. The second top liner was installed as an ultraviolet (UV) protective liner because the original top liner (now the middle liner) did not meet KMCC's design specifications. That material was found to contain less than the specified carbon content after installation. The WC-2 SI has a surface area of 88,580 square feet and a capacity of 19,658,500 gallons. This SI was constructed with soil berms which stand approximately 10 to 12 feet above the surrounding area. This berm is approximately 25 feet wide, flat, and relatively level (Reference K158A, K320; SR, August 20, 1991).

This SI has a leak detection system between the bottom and middle liners. The leak detection system is comprised of monitoring pipes and conductivity detectors. Two,

four-inch diameter PVC monitoring pipes allow access to the low point in the bottom liner. These pipes are equipped with detectors to monitor for leaks through the top two liners (Reference K357).

The WC-2 SI was constructed in late 1988, placed into operation in December 1988, and is presently in use (Reference K334, K342; SR, August 20, 1991). The operating practices at this SI are similar to those for WC-1 and consists of receipt of a composite liquid waste stream from Units 3, 5, and 6 and the steam plant (Reference K158A). The solutions discharged to this SI are from the following sources (Reference K158A):

- o process water softeners;
- o steam generation blowdown;
- o cooling tower blowdown from Units 3 and 5;
- o manganese dioxide product wash solution from Unit 6;
- o process seal water/filter flush; and
- o concentrated brine from the vapor recompression units.

Solution from this SI is processed through vapor recompression units to reclaim water for cooling and process use (Reference K158A). The concentrated brine effluent is discharged to either the WC-1 or WC-2 SI.

This SI was observed during an August 20, 1991 SR. On that date, the SI had approximately six feet of freeboard. The SI was surrounded by a flat and relatively level berm approximately 25 feet wide and 10 to 12 feet higher than the surrounding area. Surface water run-off should be minimal from the top of the berms. Surface water run-on from the south would be diverted around the SI berms. Precipitation may cause minimal inflow from the top of the berms or the liner surface.

5.16.2 Unit/Area Waste Characteristics

This SWMU receives wastewater from Units 3, 5, and 6 and the steam plant (Reference K158A). This wastewater originates from the following sources: process water softeners; steam generation blowdown; cooling tower blowdown from Units 3 and 5; manganese dioxide product wash solution from the clarifier in Unit 6; process seal water/filter flush; and concentrated brine from the vapor recompression units (Reference K158A).

Sampling and analysis of the applicable waste streams are reported to the NDEP annually per the KMCC NPDES permit (Reference K158A). The chemical composition and average flow rate for waste streams directed to the WC-2 SI for 1990 are listed below in Table 5.16.1.

Table 5.16.1

1990 Annual Waste Stream Analysis

	pH	Na	TDS	Ca	Mg	Mn	K	Average Flow
Steam Plant Blowdown	9.9	0.36	1.24	0.030	0.018	n/a	0.011	8.9
RCC Composite	7.1	44	134.6	1.0	1.92	0.61	3.46	1.8

Units = pH in S.U., Average Flow in gpm, All other units in g/1, "n/a" indicates no analysis (Reference K305).

This composite waste stream exhibits a pH of approximately 7.1 to 10.2 (Reference K158A, K305, K320).

Prior to construction of WC-1 and WC-2 within the former Trade Effluent settling pond area, soil samples were collected from two areas and analyzed by EP Toxicity procedures. Two near surface soil samples were analyzed for the presence of six organic compounds. Nine soil samples, collected between one and sixteen feet below grade, were analyzed for the presence of eight RCRA metals. Each analyte (except barium) was reported at non-detectable concentrations in each sample. Barium was reported at concentrations ranging between 0.1 and 1.0 mg/L. The soil pH was reported to range between 6.5 and 8.4 units (Reference K353).

5.16.3 Regulatory Status of Unit

This SI is a wastewater holding pond which is regulated by the NDEP in conjunction with KMCC's NPDES Discharge Permit (NV0000078) (Reference K020, K158A). KMCC has been monitoring the WC-2 SI since it was placed into operation in December 1988 (Reference K342, UE041-UE057).

In accordance with the requirements of the NPDES permit, KMCC conducts a series of visual inspections to assess the status of SIs constructed with multiple liners. The general chemical analyses of waste streams and a description of the waste streams received by each SI are reported in annual monitoring reports submitted to the NDEP (Reference K158A, K305, K320). Records of routine liquid level and visual observations are maintained at KMCC for review by NDEP (Reference K357).

5.16.4 Waste Constituent Migration Pathways

The potential migration pathways are the surface soils in the event of a surface spill, the material between the liners from a leak through the top two liners, the subsurface soils from a leak through the secondary liner, and possibly shallow groundwater.

5.16.5 Evidence of Releases and Potential Environmental Impacts

Indications of releases of liquids from the WC-2 SI were not observed during the SR. Indications of small releases were noted adjacent to the east corner of a pump unit which services this SI and the adjacent SI (i.e. WC-1). An area of soil measuring approximately 5 feet by 10 feet appeared white and crusty adjacent to the pump unit. These localized impacts are probably due to pump packing/seal leaks.

The Discharge Monitoring Reports (DMRs) reviewed by Kleinfelder included monthly DMRs from June 1990 through November 1991. These DMRs indicated fluid was not detected between the WC-2 liners (Reference UE041-UE057).

5.16.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods include a triple-liner system equipped with a leak detection monitoring system and control of discharge to the WC-2 SI to avoid subsurface releases and overfilling of the SI, respectively. The leak detection monitoring system, positioned between the top two liners and the bottom liner, serves as early warning of a release through the primary (top two) liners.

5.17 Ammonium Perchlorate (AP) Area - Pad 35

5.17.1 Unit/Area Design and Operational History

Pad 35 (SWMU KMCC-017) is an accumulation point for drummed, nonhazardous, solid, industrial waste. This pad is located in the central portion of the fenced and guarded KMCC facility, approximately 20 feet south of the building known as Old D-1 (Reference Map 17). The construction features of this accumulation point consist of an "L" shaped concrete pad approximately 30 feet long by 12 feet wide. The "foot" of the "L" shaped pad is in the southwestern corner and comprises an additional approximately six by ten foot area. Lines are painted on the pad and stenciled names are present denoting the type of waste to be placed in each area. The pad is not equipped with berms and is surrounded on all sides by soil (Reference K161; SR, August 20, 1991).

This pad has been in use since 1989. Between 1980 and 1989, the common trash from the AP, chlorate, and perchlorate process areas were transported to the trash storage area north of Units 1 and 2 (i.e. SWMU KMCC-002). In 1989, this area (Pad 35) was designated as a separate accumulation area for: (1) common trash potentially contaminated with AP, and (2) other industrial wastes (Reference K357).

An SR was conducted on August 20, 1991. On that date, the painted lines delineating the various storage areas and the stenciled signs for AP trash, iron oxide, and desiccant bags were clearly legible. Cracks and other signs of deterioration of the concrete pad were observed. Numerous sealed drums were positioned on the pad. Several drums were positioned on the soil surface to the south of the concrete pad. The drums positioned off the pad were labeled "Cooling Tower Sludge", "Calcined Packing Material", and "Iron Oxide Sludge".

This SWMU appeared adequate in size for storage of several drums. However, many of the drums present in this area were not stored on the pad. Surface water run-on to the pad would be from the southeast and southwest. Run-off from this SWMU would be toward the soil on the north side of this area.

5.17.2 Unit/Area Waste Characteristics

The specific wastes temporarily accumulated at this SWMU consist of drummed, nonhazardous, solid industrial waste. This waste is comprised of common trash and desiccant bags potentially contaminated with ammonium perchlorate; iron oxide sludge generated at the groundwater remediation unit (SWMU KMCC-019); cooling tower sludge; and calcined packing insulation. The waste originating from the ammonium perchlorate process area, although not hazardous waste, is drummed, sealed, labeled, and shipped off-site to the U.S. Ecology, Inc. landfill in Beatty, Nevada for disposal as a precaution because of a potential fire hazard (Reference SR, August 20, 1991; K357).

Solid samples of the iron oxide sludge from the groundwater remediation unit were analyzed in March 1990 for concentrations of total soluble chromium by both the TCLP and EP TOX methods. The analytical results indicate this material contains less than 5.0 mg/L total soluble chromium (Reference K318). However, KMCC utilizes the Beatty, Nevada facility for disposal of this material as a precautionary measure.

5.17.3 Regulatory Status and of Unit

KMCC has designated this area for storage of nonhazardous, solid industrial waste. Kleinfelder did not find documentation regarding any special regulatory status for this area.

5.17.4 Waste Constituent Migration Pathways

The migration pathways at this SWMU include spillage/leakage of waste from the drums to the surface of the concrete pad and adjacent soil. The amount of hazardous constituents or wastes from these sources is minimal and impacts are not expected to be detectable.

5.17.5 Evidence of Releases and Potential Environmental Impacts

Crystalline material was observed at a few small areas on the concrete pad. This material possibly consists of ammonium perchlorate or sodium chloride. Crystalline material was also observed as a growth around the sealed top of one drum positioned on the soil adjacent to the southwestern portion of the pad and was also observed on the soil at the base of this drum. These drums were labeled "Calcined Packing Insulation".

Some of these crystals have a decided reddish tint, probably due to the iron oxide derived from the drum surface. The salt crystals on the pad appeared to be similar to those on the drum (Reference SR, August 20, 1991).

Documentation of historic releases from this SWMU was not found during this study.

5.17.6 Analysis of Release Prevention or Mitigation Measures

The wastes routinely stored at this SWMU are typically contained in drums. The release prevention methods employed at this SWMU include: the containerization of waste prior to delivery to the site; the segregation of the waste into separate handling areas; and securely sealing the stored drums. The overall appearance of this SWMU suggests relatively good housekeeping practices are employed. However, the drums which were observed to be temporarily stored on the soil surface adjacent the southern side of this SWMU should be stored on the concrete surface.

5.18 Drum Crushing Area

5.18.1 Unit/Area Design and Operational History

The drum crushing and recycling area (SWMU KMCC-018) is located within the fenced and guarded KMCC facility approximately 160 feet east of Building Old D-1 and approximately 40 feet north of the toe of the berm surrounding the AP-5 SI (Reference Map 18). This SWMU consists of a hydraulic drum crusher positioned on a concrete pad. The pad is approximately 18 feet long by 18 feet wide, covered by a roof, and open on four sides. The concrete pad is not equipped with run-on/run-off control berms (Reference SR, August 20, 1991).

The AP drum crusher has been in operation since 1984. The drums are typically rinsed in the AP process areas, after they have been emptied of product. The empty steel drums are delivered to this area and temporarily stored on the soil surface adjacent to the crusher. After crushing, the drums are recycled as scrap metal (Reference K357).

It is believed that prior to approximately 1973, the drums were disposed of in the BMI landfill (Reference K357). Drums and portions of drums began to be recycled as scrap steel through off-site companies in approximately 1973.

An SR of this area was conducted on August 20, 1991. On that day, approximately 300 drums were observed temporarily stored on the soil in the vicinity of the crusher,

waiting to be crushed, and approximately 50 crushed drums were stored immediately north of the crusher. A cursory review of some of the drums revealed that most were free of product and only a few contained some small amounts of crystalline residue. Evidence of product was not noted on the concrete pad.

Surface water run-on could flow onto and around the concrete pad from the south. Run-off would flow to the north through the drum storage area, continue for a short distance, and then exit this area to the east along an adjacent asphalt surfaced road.

5.18.2 Unit/Area Waste Characteristics

The specific wastes managed at this SWMU are empty, metal 55-gallon DOT 17-H drums which originate in the AP process area. The drums are classified as nonhazardous solid waste destined for recycling.

Some drums may contain small quantities of residual chlorates/perchlorates which are soluble in water.

5.18.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. However, this SWMU appeared to be operated in conformance with operating practices for nonhazardous solid waste destined for recycling.

5.18.4 Waste Constituent Migration Pathways

Because the drums are typically rinsed prior to delivery to this area, the possibility of residual constituents to migrate and impact the surrounding environment is reduced.

5.18.5 Evidence of Releases and Potential Environmental Impacts

Small quantities of white crystalline deposits were observed on the soil slightly north west of the crushing area and adjacent to an asphalt road. This material did not appear

to be associated with this SWMU and is likely ammonium perchlorate, salt, or another product spilled during other material transfer operations in the area (Reference SR, August 20, 1991). Documentation of historic releases from this SWMU was not found during this study.

5.18.6 Analysis of Release Prevention or Mitigation Measures

The release prevention method related to this SWMU is the rinsing of the drums in the AP process areas prior to delivery to this area.

This SWMU appeared adequate in design for the crushing of drums. The operating practices could be modified to further reduce the possibility of release to the environment. Management inspection of drums prior to delivery to this unit is one method which may reduce the possibility of release to the environment.

5.19 Groundwater Remediation Unit

5.19.1 Unit/Area Design and Operational History

SWMU KMCC-019 is a groundwater remediation unit which intercepts and treats a plume of chromium contaminated shallow groundwater from beneath the KMCC property. This area is located in the central portion of the fenced and guarded KMCC property, approximately 2,400 feet north and downgradient of process areas in the Unit 1 through 6 buildings (Reference Map 19).

This SWMU has been in operation since September 1987 and occupies an area approximately 1,200 feet long east-west by 650 feet wide north-south. This SWMU consists of a line of 11 groundwater interceptor wells approximately 900 feet long, two downgradient groundwater recharge trenches for management of treated groundwater, numerous monitoring wells, and a groundwater treatment unit. The groundwater treatment unit electrolytically reduces chromium and other heavy metals and precipitates them as iron oxide sludge. This treatment system is designated with a sign and comprises an electrolysis unit, tanks, pumps, filter presses, a clarifier, a sump, and other equipment which are situated on a concrete pad. This concrete pad is approximately 60 feet long east-west by 20 feet wide north-south and is located in the western portion of this SWMU. The pad has concrete berms on the north, east, and west sides and is open to the south side. The concrete berms are approximately eight inches thick and range from four to eight inches high. The pad is sloped to a sump in the northeast corner and away from the unbermed side (Reference K304; SR, August 20, 1991).

The following paragraphs provide background information regarding why this groundwater remediation system was constructed, the design criteria, and how it has been operated.

The production of sodium chlorate occurred in Units 4 and 5 from 1945 to November 1989 (Reference Plate 3-2). Additionally, the eastern portion of Unit 5 has been used to produce sodium perchlorate from 1945 to present. The sodium chlorate and sodium perchlorate processes utilize sodium dichromate (hexavalent chromium) in the process solutions to aid the electrolytic process (Reference CA017).

Process liquors, spillage, and washwater from the sodium chlorate and sodium perchlorate processes were caught in the basements of Units 4 and 5 and were subsequently pumped and removed from the basements. These materials were either returned to the process or managed as effluent. Deterioration and cracking of the concrete basement floors resulted in release of chromium bearing chlorate process liquids to the underlying soils and groundwater. Consequently, the shallow groundwater beneath portions of the site has been contaminated with chromium (Reference K091).

As a result, identification and clean up of the chromium contaminated groundwater was initiated by KMCC based on a September 9, 1986 NDEP Consent Order (Reference K304). KMCC has operated a chromium remediation system since September 1987 in compliance with the September 9, 1986 Consent Order (Reference ND006). The following paragraphs provide background on this remediation system.

A series of groundwater monitoring wells were installed on the KMCC site in 1981 and 1982 to monitor RCRA "regulated units", SI S-1, SI P-1 and the hazardous waste landfill. These units are now certified closed by NDEP (Reference K079, K084, K167). Groundwater monitoring results indicated chromium was present in the shallow groundwater beneath portions of the site (Reference K084). Several additional groundwater monitoring wells were installed and the source and extent of the chromium contamination was traced to the basements of Units 4 and 5 (Reference K091).

In 1985, KMCC completed a "Hydrogeological Investigation" (Reference K167) which provided the basis for an evaluation of the location and design of a groundwater intercept, treatment, and recharge system (Reference K304). The 1985 hydrogeological report revealed that Units 4 and 5 were identified as the source areas of chromium impact to the "Near-Surface" groundwater and that actions had been taken to eliminate further leakage (Reference K167). These initial actions included concrete sealing and repair in the basements and initial pumping of groundwater from monitoring well M-3 in 1983 and 1984 (Reference K091, K092, K105, ND049). Additionally, the 1985 hydrogeological report indicated that the chromium plume had migrated at least 4,000 feet downgradient (to the north) from the point of leakage.

This plume was further described as "typically narrow" because migration was occurring primarily through a narrow, buried stream "channel fill" deposit (Reference K167).

On September 9, 1986 KMCC entered into a Consent Order with the NDEP to remediate chromium contamination in the groundwater beneath the site (Reference K304). The Consent Order required KMCC to:

- o design, construct and operate a groundwater intercept system;
- o monitor the effectiveness of the intercept system;
- o install a chromium treatment system;
- o design, construct and operate an underground disposal system (recharge system); and
- o provide monitoring wells to measure the impact of the recharge system on groundwater levels and groundwater quality.

The groundwater interceptor system installed by KMCC is located approximately 600 feet north and downgradient of the AP surface impoundments. The basis for installing the recovery system in this area was to intercept shallow groundwater with high chromium concentrations in an area which exhibits favorable hydrogeological properties. This system is designed to intercept groundwater having chromium concentrations greater than 5.0 mg/L (Reference K304).

The interceptor system is comprised of 11 groundwater intercept wells; identified as I-A through I-K. The intercept system is approximately 1,600 feet long, trends in an east-west direction, and was designed to cross the width of the chromium plume (Reference K304).

KMCC also installed approximately 9 groundwater monitoring wells (within the area of the trough of depression created by operation of the intercept system) to monitor the effectiveness of the intercept system. Groundwater level readings obtained from these wells are used to evaluate the effectiveness of the intercept system (Reference K304).

An electrochemical reduction process was chosen as the method for removal of chromium from the groundwater. The electrochemical process reduces hexavalent

chrome to trivalent chrome. The process generates ferrous ions from the use of iron electrodes thus producing an iron oxide precipitate containing reduced heavy metals. The system was designed to meet the NDEP required effluent requirements (hexavalent chrome concentration of <0.05 mg/L and total chrome concentrations of <1.7 mg/L) with the following maximum feed quantities/characteristics (Reference K304):

- o hexavalent chrome 10 mg/L;
- o total chrome 10 mg/L;
- o pH 7 - 8; and
- o flow 100 gallons per minute.

The treated groundwater recharge system constructed by KMCC is located approximately 250 feet downgradient (north) of the interceptor line. The recharge system consists of two parallel, roughly east-west trending, recharge trenches. The trenches are located approximately 75 feet apart from one another. The southern trench (primary recharge trench) is approximately 1,100 feet long whereas the northern trench (auxiliary trench) is approximately 800 feet long (Reference K303, K304).

Groundwater monitoring wells used to evaluate the impact of the recharge system on groundwater levels consists of a series of wells located: (1) upgradient of the recharge system, (2) within the immediate vicinity of the recharge system, and (3) downgradient of the recharge system. Groundwater level changes in the wells located in the vicinity of the recharge system represent maximum impact to groundwater elevation. Groundwater level changes in the downgradient wells are compared to groundwater level changes in the upgradient wells. Corresponding rises or declines are attributable to a regional rise or decline in groundwater elevation. Differences in elevation change represent the impact of the recharge system on groundwater elevations (Reference K304).

KMCC chose five monitoring wells to sample periodically and analyze for chromium concentrations as a means to monitor the groundwater quality. The five wells (termed Appendix J wells) are located along the center line of the chromium plume, and extend from near the chromium contaminations source (Units 4 and 5) to near a northeast

corner of the KMCC property boundary (approximately 600 feet north of WC-1 surface impoundment). Evaluation of the chromium concentration in groundwater samples collected from these monitoring wells enables KMCC to evaluate the effectiveness of the groundwater clean-up program (Reference K304).

The effectiveness of the chromium groundwater remediation program is evaluated through periodic monitoring and analysis of groundwater at specific groundwater monitoring wells (identified in the September 9, 1986 Consent Order) and effluent from the chromium treatment system. The data obtained is summarized in performance reports which are distributed to the NDEP on a quarterly or semi-annual basis (Reference K303, K304).

During the first quarter of 1988, physical modifications to the groundwater treatment plant were made to increase its efficiency and reliability. An additional electrolytic cell was added to the treatment plant to preclude extended shutdown during cleaning and replacement of electrodes (Reference ND010).

In general, by the first quarter of 1989, the rate of decline in the groundwater level throughout the Consent Order monitoring area (which had been dropping each quarter) had essentially stabilized (Reference ND002). By the forth quarter of 1989, the groundwater level within the majority of the interceptor wells was at or below the surface of the Muddy Creek Formation (Reference ND039).

An SR of the groundwater treatment unit was conducted on August 20, 1991. On that date, the area of the SWMU was clear of debris and well maintained. Cracks, cold joints, and other types of deterioration of the concrete containment pad and berms were not observed. The area surrounding the concrete pad was comprised of soil. On the day of the SR, sludge was present on the concrete floor of the SWMU beneath the degassing unit. This one time cleanout of nonhazardous filter cake from the degassing unit consisted of opening the unit and allowing the filter cake to fall to the floor. The water drains from the filter cake into the containment recovery sump. This water is recycled into the treatment system. The filter cake is allowed to dry and is then shoveled into drums. The drums are closed and placed with other nonhazardous filter cake material for transport to SWMU KMCC-017 and eventual off-site disposal.

Iron oxide from the filter press was stored in drums in the southeastern corner of the treatment unit. Small quantities of the iron oxide had spilled onto the soil surface adjacent to the south side of the pad. Some of the iron oxide sludge had also spilled over the berms on the north side of the containment pad and onto the adjacent soil surfaces. The iron oxide has been tested using EP Toxicity methods and shown to have nonhazardous concentrations of total chromium.

Stormwater would flow toward the SWMU from the south and be diverted around the unit to the east or west, therefore, there would be no run-on. The concrete pad slopes gently toward the north allowing water which falls onto the pad, or water generated from equipment washdown, to be collected in the sump along the north berm and recycled back into the treatment system.

5.19.2 Unit/Area Waste Characteristics

The specific waste generated at the SWMU is iron oxide sludge and filter cake which contains chromium. Solid samples of the iron oxide filter cake (sludge) were analyzed in March 1990 for concentrations of soluble chromium by both the EP Toxicity and TCLP test methods. The results of these analyses indicated a concentration of 0.94 mg/L by EP TOX and 2.5 mg/L by TCLP methods. These analytical results showed this material leached significantly less than the regulatory standard (40 CFR 261.24) of 5.0 mg/L total chromium (Reference K318). KMCC manages this material as nonhazardous waste. The iron oxide is containerized in drums and transported to SWMU KMCC-017 where they await off-site disposal (Reference K357; SR, August 20, 1991).

5.19.3 Regulatory Status of Unit

This SWMU is regulated under a consent agreement between KMCC and NDEP dated September 9, 1986 (Reference K304). Results of the system's performance and the chemical analyses of treated groundwater are reported to the NDEP in semi-annual performance reports (such as Reference K303).

The "Chromium Mitigation Program" has been in effect for approximately 4 years. KMCC concluded the following in a recent performance report, dated July 26, 1991 (Reference K303):

- *effective groundwater interception and treatment are being attained;*
- *the effect of changing the pumping rates of the interceptor wells will continue to be monitored, and appropriate responses (i.e.-future pump rate adjustments) will be taken to assure optimal drawdown and plume interception;*
- *discharge chromium concentrations for the treatment facility are below established requirements;*
- *groundwater samples obtained from monitoring wells downgradient of the recharge trenches show that groundwater is being remediated; and*
- *no adverse impacts to downgradient groundwater levels have been observed as a result of returning treated groundwater to the near-surface aquifer via the recharge trenches.*

Analysis of the activities and conclusions included within the July 26, 1991 performance report reveal the following (Reference K303):

- groundwater within the interceptor wells has been drawn down to levels at or below the base of the Muddy Creek Formation. However, the cones of depression are steep and overlapping drawdown cones are not indicated throughout the entire length of the intercept line (Reference Figure B-4, Interception Areas I-B through I-C, I-E through I-F, and I-H through I-K). Therefore, it appears that some chromium contaminated groundwater is not captured by the interceptor wells;
- appendix J well M-72 (one of five wells in which groundwater samples are designated to be analyzed for chromium according to the September 9, 1986 Consent Order), is located downgradient of the interceptor system and upgradient of the recharge system. This well has shown an increase in total chromium concentrations between December 1988 and June 1991;
- in May 1990 KMCC began to monitor wells M-71 and M-73 for chromium contamination. These wells are located downgradient of the interceptor system and upgradient of the recharge trenches. From May 1990 to June 1991, these wells have shown an increase in total chromium concentrations; and
- in May 1990 KMCC also began to monitor wells M-84 and M-88 for chromium contamination. These wells are located downgradient/oblique gradient of the recharge system respectively. From May 1990 to June 1991, monitoring well M-84 revealed decreasing concentrations of total chromium and monitoring well M-88 showed a slight increase in total chromium concentrations. This data appears to show that the groundwater interceptor and treatment systems are reducing chromium concentrations in groundwater to concentrations less than the discharge criteria.

In general, data obtained as part of the chromium remediation program indicates the intercept system is capturing much of the chromium contaminated groundwater and the treatment system is effectively reducing chromium concentrations to below established requirements for total chromium (Reference K303).

Prior to the implementation of the chromium groundwater remediation program, chromium concentrations in groundwater ranged from approximately 90 mg/L near the source at Units 4 and 5 to less than 1.0 mg/L near a northeast corner of the property boundary (approximately 600 feet north of WC-1 surface impoundment). The chromium plume had migrated approximately 4,000 feet downgradient from its source at Units 4 and 5 (Reference K167).

The chromium groundwater remediation system was implemented in 1987. Concentrations downgradient of the remediation system appear to be decreasing and environmental impacts to the groundwater downgradient of the recharge system appear to be low (Reference K303).

5.19.4 Waste Constituent Migration Pathways

Shallow groundwater contaminated with chromium is intercepted and treated by the installed system. 1991 analysis of the treated water recharged to the shallow groundwater downgradient of the interceptor system indicates that total chromium concentrations in this water are less than the established consent order requirements (Reference K303).

The iron oxide sludge and filter cake generated by the groundwater treatment unit may migrate to the surface soils if a spill occurs outside of the containment berms.

5.19.5 Evidence of Releases and Potential Environmental Impacts

In a July 1991 performance report, KMCC concluded that effective groundwater interception and treatment are being attained. Although the water level in the interceptor wells is drawn down to levels below the base of the Muddy Creek Formation, full overlap of the cones of depression may not be complete. Therefore, it appears that some chromium contaminated groundwater may not be captured by the system. Leakage through the interceptor system, however, would be diluted at the recharge trenches and the NDEP requirements for chromium concentration downgradient of the remediation system would be met (Reference K303).

A small quantity of iron oxide sludge was noted outside the bermed area on the soil north of the groundwater treatment unit and a small quantity of iron oxide filter cake was observed spilled onto the soil south of the groundwater treatment unit. This waste, however, is insoluble and contains nonhazardous concentrations of chromium (Reference K318).

5.19.6 Analysis of Release Prevention or Mitigation Measures

A series of groundwater monitoring wells are included in this SWMU as a monitoring system to evaluate the effectiveness of the chromium remediation program.

In general, data obtained as part of the chromium remediation program indicates the intercept system is capturing much of the chromium contaminated groundwater and the treatment system is effectively reducing chromium concentrations to below established requirements for total chromium (Reference K303, K304).

5.20 The Beta Ditch

5.20.1 Unit/Area Design and Operational History

The Beta Ditch is an unlined east-west drainage which extends through KMCC, Timet, and BMI property. The following paragraphs present information related to the entire course of the Beta Ditch. However, for the purpose of defining the Beta Ditch as a KMCC SWMU, only the portion which occurs on KMCC property has been considered as KMCC SWMU-020. Remaining portions of the Beta Ditch are more appropriately addressed by the applicable landowners.

The Beta Ditch was constructed in approximately 1941 or 1942 during construction of the BMI complex by the U.S. Government. This unlined ditch originated at a storm sewer outfall located just northwest of the current KMCC AP maintenance shop (Reference Map 20). From this point, the Beta Ditch extended to the east (beyond the current KMCC property boundary) to a siphon location currently controlled by Timet. This drainage ditch was extended westward in 1970 to allow Stauffer and Montrose wastes to be transmitted through the Beta Ditch. The siphon transmitted flows under Boulder Highway to another unlined open surface ditch (The "Acid Ditch") which paralleled the southern margin of the upper BMI ponds. Flows were then routed to ponds within the upper or lower BMI pond system via a distribution ditch within the pond system (Reference K056, K061, K161, K164, UE104).

The Beta Ditch has been used for two primary purposes:

- pre-1976: management (transfer) of a variety of liquid and slurried wastes originating from U.S. Government operations, the various operating companies and lessees between 1941/1942 and 1976. These wastes and stormwater run-off were transmitted to the upper and lower BMI ponds; and

- post-1976: management of non-contact cooling water and stormwater run-off periodically between January 1976 and present. These non-industrial effluents have been transmitted to the Las Vegas Wash by the Alpha Ditch or Pittman bypass pipeline (Reference K158A, UE060).

The flows periodically transmitted through the KMCC portion of the Beta Ditch prior to January 1976 included the following:

- magnesium related waste streams from the production of magnesium by the U. S. Government between 1941/1942 and 1944 (Reference K164);

- chlorate, perchlorate, and boron process wastes and related waste streams from cooling tower blowdown, boiler blowdown, and housekeeping washings generated by KMCC (and its predecessors) and their tenants between 1947 and 1976 (Reference K037, K039, K056);

- stormwater run-off from throughout much of the southern portion of the BMI complex between 1941/1942 and 1976 (Reference K056, K178, K265);

- Stauffer and Montrose waste streams from 1970 to April 1, 1976 (Reference UE091, UE104);

- effluent from the U.S. Lime and Flintkote facility (now owned and operated by Chemstar) (Reference K265, UE072); and

- waste streams from the State Industries lease area from approximately 1969/1970 through 1974 and area stormwater run-off from 1969 through present (Reference K263, K265, K302, UE103, UE114).

Between 1971 and January 1976, KMCC progressed through institution of a "zero discharge" industrial wastewater effluent program (Reference K347). From January 1976 to present, the KMCC portion of the Beta Ditch has been used to transmit the following materials to the Las Vegas Wash:

- stormwater run-off from throughout the southern portions of the KMCC property including various lease areas (Reference K178, K158A);

- o once through, non-contact cooling water from KMCC operations (Reference K056, K158A);
- o periodic discharges from the old main cooling tower (between January 1976 and October 1989) resulting from recirculation water upsets (Reference K034, ND048, UE033);
- o effluent from the Flintkote facility (now owned and operated by Chemstar) until a reclaim tank was installed in 1979 (Reference UE072; and
- o Stauffer and Montrose waste streams prior to April 1, 1976 when these companies also attained "zero discharge" for industrial wastewater (Reference UE091, UE104); and
- o periodic stormwater run-off from throughout the Stauffer (now Pioneer) portion of the BMI facility (Reference UE060, UE063, UE076).

An SR of the Beta Ditch was conducted on September 20, 1991. On the day of the SR, the Beta Ditch was generally clear of debris and well maintained. The "Stauffer extension" of the Beta Ditch which extends the ditch approximately 800 feet from KMCC's western property boundary to the point of confluence with the Beta Ditch was also clear of debris.

On the eastern portion of the property, the Beta Ditch is joined by a small diversion ditch just northwest of the corner of surface impoundment C-1 (Reference Map 20). This diversion ditch, also considered part of the Beta Ditch system, receives stormwater run-off from the manganese tailings area (SWMU KMCC-009) and historically received water from the old cooling tower upsets until the cooling tower was removed from service in September 1989. The SR of this diversion ditch was performed on August 20, 1991. The diversion ditch was lined with broken concrete and metal parts of cells (rip-rap) to reduce bank erosion.

The average width of the Beta Ditch was approximately 6 to 7 feet. The banks were sloped at approximately 1-1/2: 1 horizontal to vertical. The average depth of the Beta Ditch varied from 3-1/2 to 4-1/2 feet on the western portion of the property to 2 to 3-1/2 feet on the topographically lower eastern portion of the property before convergence with the diversion ditch northwest of surface impoundment C-1. East of this convergence point, the northern bank of the Beta Ditch was approximately 2-1/2

feet high whereas the southern bank was approximately 7 to 8 feet high. The diversion ditch was approximately 1 to 1-1/2 feet deep, had irregular bank heights and slopes, and averaged approximately 5 feet of bed width in most places.

Evidence of flows through the ditch were characterized by scour marks and light colored sediment and salt-like deposits throughout the majority of the Beta Ditch. Evidence of overtopping or other flooding of the Beta Ditch system was not observed.

5.20.2 Unit/Area Waste Characteristics

The Beta Ditch has been used since 1941/1942 for the transmission of various waste streams and storm water run-off. Between 1941/1942 and present, use of this drainage and the types of waste conveyed have changed as noted previously. The following is a summary of known waste streams conveyed through the KMCC portion of the Beta Ditch.

U.S. Government Operations - 1941/1942 to 1944

Kleinfelder did not find documentation describing the chemical composition of waste conveyed through the Beta Ditch during the U.S. Government operations era. This drainage was used to convey "Trade Effluent" wastes to the upper and lower BMI ponds. This waste included both acid effluent and waste caustic liquor which was formerly disposed of in the Trade Effluent evaporation/settling ponds (Reference Doc. K164, UL020).

KMCC (and Predecessors) 1945 to 1976

From 1945 to January 1976, the Beta Ditch was used as the primary means to convey aqueous process wastes to the upper and lower BMI ponds (Reference K056). The aqueous waste did not contain manganese dioxide process wastes; however, it did contain waste effluents from the following processes (Reference K037):

- o sodium chlorate (1945-1974/1976)
- o potassium chlorate (1945-1974/1976)
- o sodium perchlorate (1945-1974/1976)
- o potassium perchlorate (1945-1974/1976)

- o manganese perchlorate (1969-1974/1976)
- o ammonium perchlorate (1951-1974/1976)
- o boron processes (1972-1974/1976)

Prior to January 1976, the average combined volume of effluent from the above processes that was discharged to the Beta Ditch (based on a 1970 NPDES report) was approximately 600,000 gallons per day (Reference K037). The average content of this combined effluent, estimated by mass balance methods, is shown on the following table.

TABLE 5.20.1
AVERAGE DISCHARGE TO BETA DITCH (Pre 1976)
(Reference K037)

Parameter	Mass Flow	
Total Dissolved Solids	19,100	pounds/day
Total Solids	20,200	pounds/day
Suspended Solids	1,080	pounds/day
C.O.D.	110	pounds/day
NH_3	35	pounds/day
Calcium	2,000	pounds/day
Iron	1,100	pounds/day
Potassium	1,200	pounds/day
Sodium	5,000	pounds/day
Magnesium	150	pounds/day
Zinc	130	pounds/day
Manganese	1,800	pounds/day
Nickel	8	pounds/day
Lead	4	pounds/day
Copper	4	pounds/day
Cobalt	1.5	pounds/day
Chromium	0.3	pounds/day
Phosphorous	0.4	pounds/day

In addition to the process effluents, the Beta Ditch flows also included liquids from cooling tower blowdown, boiler blowdown, housekeeping washings, storm drains, (See Section 5.30) acid drains (See Section 5.31) and once through cooling water (Reference K056). Housekeeping washings not returned to the process were discharged to the storm drains or acid drains. These units are designed SWMUs KMCC-030 and -031, respectively. They are discussed in Section 5.30 and 5.31.

In January 1976, KMCC achieved a "zero discharge" industrial wastewater effluent status wherein the Beta Ditch was no longer used to routinely convey industrial wastes (Reference K347).

Other Operating Companies and Tenants 1945 to 1976

This drainage also conveyed waste streams from Stauffer and Montrose operations between 1970 and April 1976 (Reference UE091, UE104). U.S. Lime or Flintkote (operating at the facility now owned and operated by Chemstar) also contributed to flows to the Beta Ditch prior to 1979 (Reference K265, UE072). Detailed documentation regarding the composition of their wastes was not found during this study.

This drainage also conveyed waste streams from some of KMCC's lessees including State Industries. Between June 1970 and September 1972, State Industries discharged approximately 35,000 gallons of liquid process waste per month to the Beta Ditch through the acid drain system (Reference UE103). This material consisted of approximately 2,500 gallons of spent sulfuric acid, 300 pounds of borax, 500 pounds of soda ash, and 4,000 pounds of phosphate chemicals each month (Reference UE103). State Industries also discharged process waste to the acid drain system on three occasions between June 7 and December 10, 1974 during surface impoundment repairs (Reference K298, K300, K301). Additionally, State Industries discharged neutralized and un-neutralized cyanide solutions (containing approximately 176 pounds of cyanide) to the Beta Ditch through the acid drain system between June 1970 and October 1971 (Reference UE103, UE114). Normally, this waste was mixed with a calcium hypochlorite solution prior to discharge (Reference K302).

KMCC 1976 to Present

Following achievement of the "zero discharge" industrial wastewater effluent status by KMCC in January 1976, the Beta Ditch has been used primarily to routinely convey only storm water run-off and once through, non-contact cooling water to the Las Vegas Wash (Reference K056, K158A, K178, K347). Between January 1976 and October 1989, periodic upsets associated with the old main cooling tower were also discharged to the Beta Ditch. Discharges from the cooling tower would contain elevated concentrations of salts naturally present in the feed water (Reference K326, K327, K329, K330, K331, K347, UE033).

Other Operating Companies and Tenants 1976 to Present

Following initiation of a "zero discharge" effluent program by Stauffer and Montrose on April 1, 1976, the Beta Ditch routinely received storm water run-off from these areas of the BMI facility (Reference UE063, UE080, UE091).

5.20.3 Regulatory Status of Unit

Early discharges to the Beta Ditch were unregulated. The NDEP began to regulate discharges to this drainage when the NPDES program was initiated in the early 1970s.

Lined surface impoundments were constructed on-site by KMCC and used for the management of process and waste fluids from 1972 to present (Reference K003, K013, UE030). Routine industrial waste discharges to the Beta Ditch were ceased by KMCC by January 1976 with diversion of these discharges to lined on-site surface impoundments (Reference K347). Current discharges to the Beta Ditch are regulated by the NDEP through NPDES permits including KMCC's (NV0000078) and are reported to the NDEP in monthly discharge monitoring reports (Reference K158A).

5.20.4 Waste Constituent Migration Pathways

Each of the migration pathways (air, soil, surface water, and groundwater) could have been involved with the Beta Ditch.

Air releases could occur (or could have occurred historically) if contaminated particles become airborne when the channel surface dried (Reference K170).

Releases to the soil have historically occurred based on the fact that the Beta Ditch is not lined. Waste stream constituents would have percolated into the soil and to groundwater. Migration of constituents to groundwater could still occur as the Beta Ditch is used to transmit stormwater run-off and once through cooling water (Reference K170).

5.20.5 Evidence of Releases and Potential Environmental Impacts

Releases to the soil are evident along the Beta Ditch. Based on the average content of the combined effluent waste stream as reported to EPA by KMCC (Reference Table

5.20.1), effluent percolating into the adjacent soils contained high concentrations of dissolved solids including various heavy metals such as chromium and lead (Reference K037). A water balance calculated by KMCC in 1982, using information provided by the U.S. Bureau of Reclamation and using 1981 as the base year, suggested that seepage from the Beta Ditch was approximately 100,000 gallons each day of use or roughly 3.5 percent of the solution transmitted (Reference K061).

Based upon this seepage capability, it is quite likely that infiltrating effluent reached groundwater.

Historic releases to the air may have occurred. Soil sampling conducted by Ecology and Environment (E & E) around the perimeter of the BMI complex indicated the presence of chromium above background concentrations in three off-site soil samples (Reference K179). The concentration of total chromium in two soil samples was reported at 12 and 17 ppm compared to a background concentration of 8 ppm (Reference K179). The location of these two samples was adjacent to the Boulder highway and within approximately 1/4 mile of the Beta Ditch. Based on the proximity of these locations to the Beta Ditch, it can be postulated that the presence of chromium at these locations may have come from facility activities.

Historic and future releases to surface water (the Las Vegas Wash) are possible. Residual contaminants, chiefly soluble salts, present in the Beta Ditch can be mobilized.

Review of the August 2, 1979 aerial photography revealed the presence of a yellow liquid effluent discharging from the western storm sewer outfall into the Beta Ditch and being conveyed to Las Vegas Wash (Reference K164). The source, nature and duration of this effluent discharge is not known.

5.20.6 Analysis of Release Prevention or Mitigation Measures

There are no historic or current release prevention measures associated with the Beta Ditch. The Beta Ditch remains unlined and stormwater run-off conveyed through this drainage can percolate into underlying soils. Additionally, releases to the air can occur when soils lining the Beta Ditch dry and winds mobilize this material.

The Beta Ditch flows are monitored for volume, pH and constituents as part of the various facility NPDES programs. The NPDES monitoring program appears to be adequate for documenting the quantity and quality of flows through the portion of the Beta Ditch controlled by KMCC during storm or release periods (Reference K158A).

5.21 Sodium Perchlorate Platinum By-Product Filter - Unit 5

5.21.1 Unit/Area Design and Operational History

This SWMU (KMCC-021) is a generation point for a platinum bearing filter cake which is a by-product from the sodium perchlorate process. This SWMU is located within the fenced and guarded KMCC facility and consists of a filter located adjacent to the southeast corner of Unit 5 and the adjacent drum storage area (Reference Map 21).

The design features of this area include a raised concrete pad, approximately 75 feet wide by 100 feet long, surrounded on four sides by 8-inch thick by 8-inch high concrete berms. The tops of the berms are approximately 2 to 2-1/2 feet above the surrounding asphalt paved area. The filter press, appurtenances, tanks and drum are located within this concrete bermed containment area. The sump is composed of concrete and was formed during the pouring of the entire containment pad. The sump is approximately 2 1/2 feet by 2-1/2 feet by 2 feet deep with a capacity of approximately 94 gallons. Liquid is lifted from the sump by a centrifugal pump with the inlet pipe positioned near the floor of the sump. A sump is located in the northeast corner of the containment area. Process liquids and washdown water accumulate in the sump and are returned by a pump system to the process. The filter containment area is within the process area which is further contained by berms at the north and south ends (Reference SR, August 20, 1991).

This filter press has been in operation since 1968. The operating practices in this area consist of filtering sodium perchlorate process solution before it is routed to the ammonium perchlorate plant. The filtering operation uses diatomaceous earth to filter solids from the sodium perchlorate solution. The filter cake, a process by-product, drops from the filter press into a hopper. This material is then loaded directly into drums within the containment area, or the filter hopper is transported by forklift to SWMU KMCC-007 for drying if damp or wet. The material is shipped in drums to an off-site precious metal recovery company because of the recoverable quantities of platinum contained in this by-product (Reference K335, K336, K337, K357).

An SR of this SWMU was conducted on August 20, 1991. On that date, the filter press was finished with a filtering run and a small quantity of filter cake was in the hopper beneath the filter press. Liquid was present on the pad and in the sump in the northeast corner of the containment area. The concrete floor had several former cracks which had been sealed. However, the sealant was in need of repair in a few of the cracks. The concrete berms appeared in good condition except for one seam in the vicinity of the sump which was weeping a small quantity of fluid onto the asphalt area outside of the SWMU.

Process liquids, washdown water, and precipitation which occurs within the bermed area would flow to the sump located in the northeast corner and be recycled into the process. Precipitation which occurs within the process area would be collected by another sump. Surface water run-on is prevented by the elevated design of this containment pad.

5.21.2 Unit/Area Waste Characteristics

The by-product resulting from the filtering operations in this area contains chiefly diatomaceous earth with traces of sodium chloride, sodium carbonate, calcium carbonate, some sodium perchlorate solids, chromium, and platinum (Reference K275, K278). A white crystalline crust forms on the outside of the filter cake material as it dries.

This material is classified as a "recyclable material" (Reference UE006).

5.21.3 Regulatory Status of Unit

The filter cake by-product containing recoverable quantities of platinum is managed as a "recyclable material" under 40 CFR Part 266, Subpart F.

5.21.4 Waste Constituent Migration Pathways

The potential migration pathways are the air, surface (concrete and asphalt), and surface water. The migration pathway appears to be spillage to the concrete or asphalt surface outside the unit but within the bermed process area. Leakage through the seams and cracks in the concrete pad or asphalt area and berm may migrate to the subsurface soil.

5.21.5 Evidence of Releases and Potential Environmental Impacts

A 1 foot by 2 foot area of fluid was observed resulting from seepage from the SWMU containment area to the process area. This leakage originated from a weeping seam in the concrete berm. This release was contained within the bermed process area where it would be recycled via the process area sump.

Several areas were also observed within the concrete containment area where small quantities of filter cake had dropped to the concrete floor. This material would be recycled back to the process by washdown activities.

Documentation of historic releases from this SWMU was not found during this study.

5.21.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed at this SWMU include the containerization of by-product material into drums at the point of generation or use of a hopper for transport to SWMU KMCC-007 for drying. The raised pad and berms also serve as part of the containment system for this SWMU. Mitigation of leaks through cracks and seams in the concrete containment structure appear to have been undertaken by caulking and/or sealing these features. Additional housekeeping activities will be needed because some of the seam seals were in need of repair as evidenced by the one weeping seam.

5.22 Former Manganese Tailings Areas

5.22.1 Unit/Area Design and Operational History

SWMU KMCC-022 comprises the former tailings areas previously used in conjunction with the manganese dioxide benefication process. Based on review of several years of aerial photography, solid materials were placed in these areas sometime between 1950 and 1979 (Reference K164). These areas are located near the east central portion of the fenced and guarded KMCC facility. This SWMU is comprised of two areas: (1) the western portion is immediately west of the current manganese tailings pile (SWMU KMCC-009) and directly north of the Chemstar operation; and (2) the eastern portion is approximately 300 feet south of KMCC-009, north of Unit 6, and on the west side of Eleventh Street (Reference Map 22; SR, August 20, 1991).

Some of the manganese dioxide tailings material placed within the "western" area of SWMU-022 appears to have been removed to facilitate construction of Surface Impoundments P-1 and S-1 in 1972 and 1974. Additionally, manganese tailings were removed from the southern portion of the "western" area and relocated to KMCC-009 in approximately 1989 (Reference K357; SR, August 20, 1991).

The "eastern" area history is obscure. Use of this area is indicated in a few documents (K059, K065, K158A), but cannot be clearly demarcated on the aerial photography (Reference K164). Manganese ore has also been stored in this general area.

An SR of the "western" area was conducted on August 19, 1991. At that time, the "western" area was clear of litter, equipment, and other materials. Tailing piles or mounds were not visibly present in this area. Evidence of their former presence was indicated by dark colored soils and yellow-brown material resembling tailings which were visible in the side walls of SIs S-1, P-1 and Old P-2. The soils in the west side wall of the P-1 SI and on the floor and west wall of the old P-2 SI were stratified with a yellow-brown material resembling manganese dioxide tailings material.

Due to the variable topography within the "western" portion of SWMU-022, surface water run-on would generally flow into this area and not form run-off.

On September 20, 1991, the "eastern" area of the SWMU was observed clear of debris and appeared well maintaincd. Concrete foundation mats for three tanks were being constructed in this former tailings area northwest of the intersection of Eleventh Street and Avenue G. One manganese dioxide ore pile was also located within this area.

The presence of prior manganese tailings placement was evidenced by dark stained soil in a recent north facing cut slope adjacent to Eleventh Street. Other evidence of the former storage area has been obscured by subsequent plant activities.

Surface water run-on would flow onto the area from the south and east and run-off would flow toward the north.

5.22.2 Unit/Area Waste Characteristics

The manganese tailings disposed of in this SWMU were from the manganese dioxide benefication process. These tailings consist of processed manganese dioxide ore which is acid insoluble. The tailings also contain trace heavy metal sulfides, silica, paraffin cake, and calcium sulfate (Reference K037, K137).

Kleinfelder did not find laboratory analyses indicating the composition of the tailings material during the time of placement in this area. However, KMCC believes the composition was probably similar to current tailings material when dewatered. Analyses of the tailings material disposed of at the current tailings site (SWMU KMCC-009) were conducted using EP toxicity testing procedures in 1979 and 1985 and by TCLP methods in 1990 (Reference Table 5.22.2 below). Analytical results from this testing reveals nonhazardous concentrations of the eight heavy metals evaluated by these tests (Reference K111, K147, K179, K264, K319, UE065).

TABLE 5.22.2
MANGANESE TAILINGS ANALYSES

Constituents	Units	1979 EP Toxicity	1985 EP Toxicity	1990 TCLP
Arsenic	mg/L	0.007	<0.5	<0.3
Barium	mg/L	0.021	<0.5	<0.5
Cadmium	mg/L	0.049	<0.1	0.45
Chromium	mg/L	0.002	<0.02	0.14
Silver	mg/L	0.012	<0.1	0.09
Selenium	mg/L	<.001	<0.1	<0.3
Lead	mg/L	0.002	<0.5	<0.3
Mercury	mg/L	<.0001	<0.0002	<0.0002

5.22.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. Manganese tailings disposal at the nearby manganese tailings pile (SWMU KMCC-009) is regulated by the NDEP under a May 15, 1985 authorization (Reference K147, K343).

5.22.4 Waste Constituent Migration Pathways

During the operational life of this SWMU, the constituents of the waste could have migrated by air, surface water, soil, or groundwater. Currently, little waste appears to be present and the pathways appear to be reduced to air and soil.

Migration via the air pathway could occur by airborne transport of dried particulate matter due to wind. Surface water run-on, as a result of precipitation in the "western" area, would likely drain into the former P-1, S-1, and Old P-2 surface impoundment depressions. Water which percolated through the tailings may form leachate and migrate into the underlying soil and groundwater.

The constituents in the tailings slurry solution prior to 1975 were chiefly manganese and sulfate. As the solution percolated, these constituents may have migrated through the soils and possibly to groundwater.

5.22.5 Evidence of Releases and Potential Environmental Impacts

Release prevention and mitigative measures instituted by KMCC occurred after this area stopped receiving manganese tailings material. These measures included removal of much of the manganese tailings material which had been placed here.

Small amounts of manganese tailings remain in the soil as evidenced in the side walls of former SIs P-1, S-1 and Old P-2 (Reference SR, August 20, 1991). The tailings are acid insoluble and analyses by EP toxicity and TCLP testing for KMCC indicate they are nonhazardous (Reference K111, K147, K179, K264, K319, UE065). Documentation of historic releases from this SWMU was not found during this study.

5.22.6 Analysis of Release Prevention or Mitigation Measures

There are no known historic release prevention measures associated with this SWMU during its operational life. Release prevention and mitigative measures instituted by KMCC occurred after this area stopped receiving manganese tailings. These measures included removal of much of the manganese waste which had been placed here.

5.23 Closed Surface Impoundment S-1

5.23.1 Unit/Area Design and Operational History

Pond S-1 (SWMU KMCC-023) was a single-lined wastewater surface impoundment located approximately 60 feet south of the steam plant within the fenced and guarded KMCC facility (Reference Map 23). This SI was constructed in October 1974 using a single liner of 20-mil. PVC on the bottom and 30-mil. CPE on the sides (Reference K003, K013, K105, UE024). The S-1 SI had an approximate surface area of 47,500 square feet and an approximate capacity of 2,000,000 gallons (Reference K105, UE024). This SI was constructed as an evaporation pond and was not equipped to recycle material back to the process (Reference K039, UE024).

SI S-1 was constructed in the same area that had been used previously for deposition of solid materials including manganese dioxide process tailings (Reference Section 5.22 of this report). Based on a review of aerial photography, SWMU KMCC-022 (the former manganese tailings areas) existed from prior to 1960 to post 1969 (Reference K164).

The S-1 SI was originally constructed to manage liquid wastes from the sodium chlorate and sodium perchlorate processes (Reference K003, K013, UE030). Liquid wastes from the potassium chlorate, potassium perchlorate, sodium perchlorate, and boron manufacturing processes were routed to, and stored in, SI S-1 through the fall of 1982 (Reference K039, K095, K105). Cooling tower and reboiler wastes from the boron trichloride process were also discharged to SI S-1 during these same dates (Reference K170). The production of potassium perchlorate was terminated in September 1982 (Reference K105). Chromium containing wastes were not placed in SI S-1 after August 1982 (Reference K130). This SI began decommissioning in the fall of 1982 and was closed in January 1983 [(Reference K105)]. A closure plan and final closure were approved by NDEP on April 16, 1985 and December 5, 1985, respectively (Reference K112, K131).

Decommissioning of SI S-1 was initiated in the fall of 1982 when the production of potassium perchlorate was terminated. The liquids were removed by solar evaporation and pumping to nearby SI P-1. During closure, the solid contents (dewatered solids

containing approximately 10% moisture) and the bottom and side liners were removed with a clamshell and paddle scraper. Approximately two feet of soil underlying the bottom and side liners was also removed during closure operations. These materials (solids, liners, and soil) were disposed in the on-site KMCC hazardous waste landfill (SWMU KMCC-013) prior to January 25, 1983 (Reference K095, K105).

Soil sampling and analyses were conducted following completion of closure work to verify that hazardous constituents (chromium) had been removed. Composite soil samples and discrete soil samples were collected during two separate sampling events from four feet below the base of the closed SI and from three feet below grade in immediately adjacent areas. The soil samples were analyzed by EP Toxicity methods and revealed concentrations of total soluble chromium ranging between < 0.02 and 0.11 milligrams per liter (mg/L). These results were significantly less than the required cleanup level of 5.0 mg/L; therefore, KMCC concluded that the closure of SI S-1 had been completed in compliance with NDEP standards (Reference K105).

The former site of SI S-1 was observed during an August 20, 1991 SR. This area appeared as a graded depression approximately 60 to 180 feet south of the steam plant. The depression was free of trash or debris and appeared well maintained. Four groundwater monitoring wells were observed in the vicinity of the SI; three were downgradient (north) of SI S-1 and a fourth was upgradient (south) of SI P-1 which is south of this SWMU.

A limited amount of surface water run-on could flow into the SI from the areas immediately adjacent to the SI. Rills were apparent in the north and south sidewalls of the excavation indicating some run-on has entered this excavation.

5.23.2 Unit/Area Waste Characteristics

KMCC submitted a Part A application for SI S-1 on November 18, 1980. Subsequently, KMCC decided to become only a generator, and SI S-1 was closed prior to the required date of a Part B application. Liquid wastes from the sodium chlorate (containing chromium) and sodium perchlorate process were originally stored in this SI between late 1974 and late 1975. By January 1976, liquid wastes from the potassium chlorate, potassium perchlorate (containing chromium), sodium perchlorate, and boron manufacturing processes were routed to and stored in SI S-1 (Reference K039, K095, K105).

The liquid wastes contained a total chromium concentration in excess of 5 mg/L by EP toxicity test methods which resulted in this waste being managed as hazardous. The residual solids (which crystallized in the nearby surface impoundment P-1 as a result of solar evaporation) were also analyzed and contained less than 5 mg/L leachable chromium when subjected to EP Toxicity testing (Reference K105).

5.23.3 Regulatory Status of Unit

KMCC submitted a Part A application for SI S-1 on November 18, 1980. Subsequently, KMCC decided to become only a generator, and SI S-1 was closed prior to the required date of a Part B application (Reference K062, K063, K095).

KMCC submitted a closure plan, for clean closure of SI S-1, to the NDEP dated April 5, 1984 (Reference K095). A revised closure plan, dated September 26, 1984, was submitted following incorporation of information requested by the NDEP (Reference K105). Following a public comment period, the revised closure plan was approved by the NDEP in a letter dated April 16, 1985 (Reference K112).

Closure of SI S-1 was conducted under interim status standards of 40 CFR Part 265 (Reference K130, K131, UE131). Following completion of closure activities by KMCC, J. H. Kleinfelder and Associates provided a review of the project activities to evaluate whether closure had been conducted in conformance with the approved closure plan. Based on the information provided by KMCC and field observations, a professional opinion was rendered that SI S-1 was closed in conformance with the intent of the approved closure plan (Reference K123). The NDEP acknowledged proper closure of SI S-1 in a letter dated December 5, 1985 and acknowledged that SI S-1 no longer remained under the interim status standards of 40 CFR Part 265 (Reference K131).

5.23.4 Waste Constituent Migration Pathways

During the operational life of SI S-1, the migration pathway would have been the underlying and adjacent soils and possibly groundwater.

5.23.5 Evidence of Releases and Potential Environmental Impacts

Kleinfelder found documentation referring to a possible liner failure for the S-1 SI in 1980 (Reference K055). Soil contaminated with chromium was removed during closure activities in the fall of 1982 (Reference K123).

The analytical results of soil samples collected to support closure revealed the presence of low concentrations of chromium in soil collected from beneath the SI bottom. These analyses showed leachable chromium concentration ranging between < 0.02 and 0.11 mg/L by EP Toxicity testing methods which was less than the required clean-up level of 5.0 mg/L (Reference K105).

The results of groundwater monitoring from monitoring wells in the vicinity of SI S-1 (conducted between May 1982 and June 1985) revealed the presence of chromium in shallow groundwater (Reference K058, K066, K068, K077, K092, K106, K126A). These results revealed that chromium was also present in groundwater samples collected upgradient of SI's S-1 and P-1 as well as downgradient of these two SI's. An expanded program was undertaken and numerous additional monitoring wells were installed in an effort to locate the source of the chromium contamination. As a result of those efforts, the source was traced to the basements of Units 4 and 5 (Reference K105, K170).

5.23.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed during the operational life of SI S-1 were (Reference K054, K105):

- o use of a single synthetic liner to contain liquid waste;
- o maintenance of a freeboard to reduce the possibility of overtopping; and
- o periodic pond monitoring to evaluate if leakage was occurring.

The S-1 SI was decommissioned in the fall of 1982 and the liner, solids, and adjacent soils were removed prior to January 23, 1983. Analytical results of soil samples collected to demonstrate clean closure revealed concentrations of total soluble chromium were significantly less than the required clean-up level of 5.0 mg/L (Reference K105).

5.24 Closed Surface Impoundment P-1

5.24.1 Unit/Area Design and Operational History

Pond P-1 (SWMU KMCC-024) was a single lined wastewater surface impoundment located approximately 200 feet south of the steam plant (immediately south of SI S-1) within the fenced and guarded KMCC facility (Reference Map 24). This SI was originally constructed in April 1972 using a single PVC liner on the bottom and CPE underliner on the side walls (Reference K003, K105, UE024). This SI was abandoned in July, 1975 (Reference K031) because the original liner failed (Reference K037, UE024). The P-1 SI was relined in 1980 with a 30-mil. hypalon liner (Reference K105). SI P-1 had an approximate surface area of 26,000 square feet and an approximate capacity of 700,000 gallons (Reference K105, UE024). SI P-1 was constructed as an evaporation pond and was not equipped to recycle material back to the process (Reference K031, K039, UE024).

Liquid waste from the potassium chlorate, potassium perchlorate (containing chromium), sodium perchlorate, and boron manufacturing processes were stored in SI P-1 between early 1972 and July 1975 and again between mid 1980 and December 1982 (Reference K031, K037, K039, K095, K105, K130). Cooling tower and reboiler wastes from the boron trichloride process were also discharged to SI P-1 during these same dates (Reference K170). The production of potassium perchlorate was terminated in September, 1982 (Reference K105). Liquors, residual salt solutions, and rinsates generated during the decommissioning and closure of SI S-1 and decommissioning of the potassium perchlorate manufacturing process were transferred to SI P-1 in the fall of 1982 and chromium containing solutions were not placed in SI P-1 after December 1982 (Reference K105, K130, K170). The P-1 SI was subsequently decommissioned prior to January 25, 1983. A closure plan and final closure were approved by NDEP on April 16, 1985 and December 5, 1985, respectively (Reference K112, K131).

Decommissioning of SI P-1 was initiated in the winter of 1982/1983 following the decommissioning of SI S-1 (Reference K105). The liquids were removed by solar evaporation (Reference K124). During closure, the solid contents, the liner, and an unknown quantity of soil from beneath the liner were removed and disposed in an on-site nonhazardous waste landfill (which is believed to be SWMU KMCC-009) between July 25, 1985 and August 8, 1985 (Reference K124, K170).

Soil sampling and analyses were conducted following completion of closure work to evaluate whether hazardous constituents (chromium) were present in the underlying soil. Soil samples were collected at one-foot increments between the surface and 4-1/2 feet below grade at six locations beneath the base of the former SI. The soil samples were analyzed using EP Toxicity testing procedures and concentrations of leachable chromium ranging between < 0.1 and 0.41 milligrams per liter (mg/L) were reported. These results were significantly less than the required cleanup level of 5.0 mg/L (Reference K124).

The former site of the SI was observed during an August 20, 1991 SR. The area appeared as a graded depression between approximately 200 to 280 feet south of the steam plant. The depression was free of trash or debris and appeared well maintained. Four groundwater monitoring wells were observed in the vicinity of the SI; three were downgradient (north) of neighboring SI S-1 and a fourth was upgradient (south) of SI P-1.

Surface water run-on could flow into the SI from the south. Rills were apparent in the east and west sidewalls of the excavation indicating run-on has entered this excavation.

5.24.2 Unit/Area Waste Characteristics

This SI was used to store liquid wastes between April 1972 and July 1975 and then again from 1980 to prior to January 25, 1983 (Reference K031, K037, K095, K105). The liquid wastes originated from the potassium chlorate, potassium perchlorate, sodium perchlorate (containing chromium), and boron manufacturing processes and were similar to wastes stored in SI S-1 (Reference K039, K095, K105). Additionally, liquors, residual salt solutions, and rinsates generated in the fall of 1982 during the decommissioning and closure of SI S-1 and the decommissioning of the potassium perchlorate manufacturing process were transferred to SI P-1 (Reference K105, K170).

The liquid waste contained total chromium concentration in excess of 5 mg/L by EP Toxicity test methods which resulted in this waste being managed as hazardous. The solids (which crystallized in this surface impoundment as a result of solar evaporation) were sampled on October 18, 1983 and analyses by EP Toxicity testing methods showed nonhazardous concentrations of leachable chromium ranging between < 0.2 and 1.3 mg/L and non-detectable concentrations of the remaining seven analyzed metals (Reference K105).

5.24.3 Regulatory Status of Unit

KMCC submitted a closure plan for clean closure of SI P-1 to the NDEP dated April 5, 1984 (Reference K095). A revised closure plan, dated September 26, 1984, was submitted following incorporation of information requested by the NDEP (Reference K105). Following a public comment period, the revised closure plan was approved by the NDEP in a letter dated April 16, 1985 (Reference K112).

Closure of SI P-1 was conducted under interim status standards of 40 CFR Part 265 (Reference K130, K131, UE131). Following completion of closure activities by KMCC, J. H. Kleinfelder and Associates provided a review of the project activities and conducted soil sampling. Based on the information provided by KMCC, field sampling, field observations, and laboratory results, an opinion was rendered that SI P-1 was closed in conformance with the intent of the approved closure plan (Reference K124). The NDEP acknowledged proper closure of SI P-1 in a letter dated December 5, 1985 and acknowledged that SI P-1 no longer remained under the interim status standards of 40 CFR Part 265 (Reference K131).

5.24.4 Waste Constituent Migration Pathways

During the operational life of SI P-1, the migration pathway would have been the underlying and adjacent soils and possibly groundwater.

5.24.5 Evidence of Releases and Potential Environmental Impacts

Kleinfelder found documentation of releases occurring during the operational life of this SI. Reference documents K031, K037, and UE024 indicate SI P-1 was abandoned in July, 1975 and relined in 1980 due to liner leakage. Soil contaminated with chromium was removed during closure activities (Reference K124). The analytical results of soil samples collected to demonstrate proper closure revealed the presence of low concentrations of chromium in soil collected from beneath the SI bottom. These analyses showed leachable chromium concentrations ranging between < 0.1 and 0.41 mg/L by EP Toxicity testing methods. These concentrations are less than the required clean-up level of 5.0 mg/L (Reference K124).

The results of groundwater monitoring from monitoring wells in the vicinity of SI P-1 (conducted between May, 1982 and June, 1985) revealed the presence of chromium in

shallow groundwater (Reference K058, K066, K068, K077, K092, K106, K126A). These results revealed that chromium was present in groundwater samples collected upgradient of SI's S-1 and P-1 as well as downgradient of these two SI's. An expanded program was undertaken and numerous additional monitoring wells were installed in an effort to locate the source of the chromium contamination. As a result of these efforts, the source was traced to the basements of Units 4 and 5 (Reference K105, K170).

5.24.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed during the operational life of SI P-1 were (Reference K054, K124):

- o use of a single synthetic liner to contain liquid waste;
- o maintenance of a freeboard to reduce the possibility of overtopping;
- o periodic pond monitoring to evaluate if leakage was occurring.

The P-1 SI was decommissioned in the winter of 1982/1983. The liner, solids, and adjacent soils were removed during closure. Analytical results of soil samples collected to demonstrate closure revealed concentrations of total chromium were less than the required clean-up level of 5.0 mg/L (Reference K105).

5.25 Truck Emptying/Dump Site

5.25.1 Unit/Area Design and Operational History

SWMU KMCC-025 is an open area where solid wastes/materials were periodically discarded. This area is located within a depression along KMCC's western property boundary approximately 800 to 1300 feet northwest of Unit 1. This area is not within the fenced and guarded KMCC facility and can be accessed by the entrance road which also services Pioneer, BMI, Koch, Saguaro, KMCC AP Plant north entrance, NuBulk Transportation, J.B. Kelly, Inc., and Chemstar. This SWMU is bounded by dirt roadways on the east, south, and west sides and a fence along the north side. A railroad track traverses east/west across this area separating the northern third from the southern third. The overall SWMU is approximately 480 feet long north-south by 320 feet wide east-west (Reference Map 25; K161, K164; SR, August 20, 1991).

This SWMU consists of an open soil surfaced depression which was periodically used between 1969 and 1991. Review of August 2, 1979 aerial photography indicates that solid materials (possibly wastes or debris) are present throughout this area (Reference K164). Additionally, the south third of this area was used sometime after August 1979. Apparently, trucks entered the southern area and deposited remnants of the various substances such as soda ash and lime which they had hauled (Reference K357, 1991).

An SR of the southern third of this SWMU was conducted on August 20, 1991. On that day, the area appeared recently graded and soil berms were in place on the east, west, and south sides of the SWMU to restrict access and limit further dumping in this area. Portions of the soil within the SWMU exhibited white discoloration and several small piles of white colored solid waste/material were observed.

The grading and presence of soil berms serves to prevent surface water run-off and run-on to this SWMU.

5.25.2 Unit/Area Waste Characteristics

The composition of the wastes deposited in the SWMU prior to August 1979, and more recently, are unknown (Reference K357).

5.25.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area.

5.25.4 Waste Constituent Migration Pathways

The potential migration pathways are the air, surface soil, subsurface soil, and possibly groundwater.

5.25.5 Evidence of Releases and Potential Environmental Impacts

The light colored soil staining and the white colored soil piles indicates the deposition of solid/material waste within this SWMU. The type and nature of solid material present in this area, as observed on August 2, 1979 aerial photography, is not known. Documentation of historic releases from this SWMU was not found during this study.

5.25.6 Analysis of Release Prevention or Mitigation Measures

The material formerly present in this area, as observed on the August 2, 1979 aerial photography, is no longer present on the surface. The disposition of this material is not known.

The access to this SWMU has been restricted through the placement of soil berming at the direction of KMCC. This action should prevent further placement of wastes within this area.

5.26 Former Satellite Accumulation Point - Unit 3, Maintenance Shop

5.26.1 Unit/Area Design and Operational History

SWMU KMCC-026 is a former satellite accumulation point for hazardous waste located within the fenced and guarded KMCC facility at the southwest corner of Unit 3 (Reference Map 26). This SWMU consists of a parts washer within Unit 3 and the adjacent open storage area where lead/acid storage batteries and waste from the parts washer are temporarily stored. Both the parts washing machinery and the drum containing the sludge from the parts washing operation are positioned on a concrete floored and walled area within the maintenance shop. The batteries and drummed parts washer waste are stored outside of Unit 3 on pallets positioned on a concrete pad. This pad is not equipped with run-on/run-off control berms. An area of soil is present adjacent to a part of the western margin of the storage pad (Reference SR, August 20, 1991).

This area was used from approximately 1989 to 1991 for operation of a solvent based parts washer. The former parts washing method has since been replaced with a caustic detergent based parts washer in 1991 (Reference K357).

Historically (1989-1991), parts were placed in the parts washer, the system was closed, and the parts washer scrubbed the parts using jets of 1,1,1-trichloroethane (TCA). The oil and grease removed from the parts accumulated in the bottom of the parts washer and was periodically withdrawn and placed in a drum stored next to the parts washer. When the drum was full, it was transported to a recycler (Reference K357).

An SR was conducted at this SWMU on August 20, 1991. On that date, the area was clear of debris and well maintained. The parts washer was located along the north wall in the southwest corner of the Unit 3 maintenance shop. The parts washer observed during the SR was a Hotsy® caustic soap washer.

Minor cracking and some staining was observed on the concrete floor in the vicinity of the parts washer as well as outside the building in the vicinity of the storage area. Petroleum hydrocarbon stained soils were also observed adjacent to the west side of the storage area. A single 2-inch diameter drain pipe was observed within the concrete surface between the storage area and the entrance to the shop.

Surface water run-on would not affect the parts washer because it is positioned within a building. Surface water run-off would flow to the west and south toward a storm drain located in Seventh Street. However, it appears that run-off would pond rather than flow into the drain due to an irregular gradient.

5.26.2 Unit/Area Waste Characteristics

The specific waste historically stored at this SWMU was a sludge resulting from parts washing operations and consisted of oil, grease, and 1,1,1-TCA. The 1,1,1-TCA containing sludge was volatile and had a very low solubility in water. This solvent waste was considered hazardous due to the presence of 1,1,1-TCA. The chemical characteristics of 1,1,1-TCA (a chlorinated solvent) are described on the applicable MSDS (Reference K033).

The current waste resulting from the new parts washing operations consists of oil, grease, and caustic detergent and is considered a regulated waste but not hazardous.

5.26.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. KMCC formerly managed this SWMU as an area for satellite accumulation of a hazardous waste when the solvent based parts washer was in use (Reference K357).

5.26.4 Waste Constituent Migration Pathways

The migration pathways include the concrete surface, adjacent soil area, surface water, and air. The migration pathways for the current process are the same. Releases which

remain on the concrete surface can be dispersed by surface water run-off to the adjacent soil and asphalt surfaced areas and storm drain in the area. Flows entering the storm sewer system would drain to the Beta Ditch through NPDES monitoring equipment (Reference K178).

5.26.5 Evidence of Releases and Potential Environmental Impacts

Staining was evident on the concrete floor surrounding the current parts washer, however, correlation between these stains and current or historic operations could not be made. The soil, concrete, and asphalt surfaces outside of the building in the vicinity of the temporary waste storage area were also stained. The connection between staining and waste release in this area could not be made because portions of this area are also used for product storage and maintenance of equipment which may contain gear lubricants, greases or oils. The observed product and waste drums appeared undamaged and in good condition.

Documentation of historic releases from this SWMU was not found during this study.

5.26.6 Analysis of Release Prevention or Mitigation Measures

The release prevention methods employed at this area include containerization of parts washer sludge from the point of generation to the point of disposal (recycling).

This SWMU appears adequate in size for the present operation and should have been adequate for the former operations. Mitigative spill response measures include prompt clean-up of spills when these occur (Reference K357).

5.27 Former Satellite Accumulation Point - Unit 6, Maintenance Shop

5.27.1 Unit/Area Design and Operational History

SWMU KMCC-027 is a former satellite accumulation point for hazardous waste resulting from a former solvent based parts washer in Unit 6. This SWMU is located inside the northeast portion of Unit 6, along the west wall of this maintenance shop, which is within the fenced and guarded KMCC facility. This area consists of a concrete floored and walled maintenance shop, a parts washer (which formerly used 1,1,1-TCA containing solvent), and a drum for temporary storage of parts washer waste (Reference Map 27; SR, February 20, 1992).

This SWMU has been in use since 1989. A closed circulation, solvent based parts washer was used for cleaning oil and grease from valves, fittings, and other items requiring maintenance until late 1991. The oil and grease containing 1,1,1-TCA accumulated in the bottom of this parts washer and was periodically withdrawn and placed in a drum stored next to the parts washer. The historic washer remains in use; however, the 1,1,1-TCA based solvent has been replaced with a nonhazardous, caustic based detergent (Reference K357).

An SR of this SWMU was conducted on February 20, 1992. On that day, the area appeared well maintained. The concrete floor and block wall in the immediate vicinity of the parts washer were intact and cracks were not observed.

5.27.2 Unit/Area Waste Characteristics

The waste historically managed in this area was an oily sludge containing oil, grease, and 1,1,1-TCA resulting from parts washing operations. This waste was considered hazardous due to the presence of 1,1,1-TCA. The chemical characteristics of 1,1,1-TCA (a chlorinated solvent) are described on the applicable MSDS (Reference K033).

The current waste resulting from parts washer operations consists of oil, grease, and a caustic detergent parts washing solution which is considered a regulated waste but not hazardous.

5.27.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. However, KMCC formerly managed this SWMU as an area for satellite accumulation of a hazardous waste when the solvent based parts washer was in use (Reference K357).

5.27.4 Waste Constituent Migration Pathways

The waste historically generated by this parts washer was containerized and stored within the same concrete floored building. The migration pathways included the concrete surface, air, and soil beneath the concrete floor.

5.27.5 Evidence of Releases and Potential Environmental Impacts

Kleinfelder did not find documentation of releases occurring in this area. Visual observation of this area was conducted during a February 20, 1992 SR because this shop was closed and locked on each occasion that previous SRs were attempted. The area surrounding the parts washer appeared well maintained. Leakage/spillage from the parts washer was not apparent.

5.27.6 Analysis of Release Prevention or Mitigation Measures

This parts washer uses a closed circulation system and is equipped with a lid which, when closed, reduced emissions of volatile constituents formerly used. The release prevention methods formerly employed in this area include containerization of parts washer sludge from the point of generation to the point of disposal (recycling). Mitigative measures included prompt clean-up of spills when these occurred (Reference K357).

5.28 Satellite Accumulation Point - AP Laboratory

5.28.1 Unit/Area Design and Operational History

SWMU KMCC-028 is a satellite accumulation point for hazardous wastes resulting from disposal of chemicals used in an on-site analytical laboratory. This SWMU is located outside, along the north wall of the laboratory in the ammonium perchlorate area, within the fenced and guarded KMCC facility (Reference Map 28).

This SWMU consists of three metal chemical storage cabinets used to store partially full containers of flammable liquids. The cabinets were properly identified. These cabinets rest on a raised concrete pad adjacent to the north wall of the laboratory. The concrete pad is approximately three inches high, two feet wide, and 12 feet long. A 55-gallon drum is situated on the asphalt surface adjacent to the cabinets. This asphalt surface surrounds the building and the raised pad. The drum is typically stored next to the northwest corner of the concrete pad to accept full containers of waste (Reference SR; August 20, 1991).

This accumulation point is currently in use. Operating practices at this SWMU consist of episodic accumulation of chemicals used in the lab. As the chemicals are used, they

are accumulated in containers and placed in the flammable liquid storage cabinets. When the containers are full of liquid waste, they are placed into a 55-gallon drum and packed in vermiculite (lab-packs). When this drum is full, it is removed for disposal (Reference K357).

An SR was conducted at this SWMU on August 20, 1991. On that day, the cabinets were observed intact, labeled "Flammable Keep Fire Away", and closed. One of the three cabinets was locked. Labels were observed on the glass bottles and metal cans indicating the chemicals contained within. A 55-gallon drum, for packaging of individual containers, was not present. This drum's standard location was evidenced by a round ring on the asphalt surface near the northwest corner of the cabinets. The area was orderly and well maintained.

Surface water run-on would flow past this area from the west and southwest and flow towards the northeast. The cabinets are positioned under the overhang of the laboratory building roof, therefore, rainfall would not fall directly on this SWMU.

5.28.2 Unit/Area Waste Characteristics

This SWMU receives liquid wastes from the adjacent on-site laboratory. These wastes are comprised chiefly of flammable liquids. The chemical and physical characteristics of the various chemicals are listed on the appropriate MSDS (Reference K033).

The containers containing liquid wastes observed during the SR were labeled with "Chemical Name", i.e. "waste methanol". The wastes observed during the SR included pyridine, toluene, nitrobenzene, methyl isobutyl ketone, and methanol.

5.28.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. However, the waste materials in the drum are regulated as a satellite accumulation of a hazardous waste under 40 CFR Section 262.34.

5.28.4 Waste Constituent Migration Pathways

The migration pathways for chemical releases at this SWMU include the concrete and asphalt surfaces, air, surface water, and possibly the soil. Because the wastes are

contained in small glass or metal containers which are then drummed as a lab pack, the potential for migration into the environment is greatly reduced. The area immediately surrounding the SWMU is asphalt covered, further reducing the potential for migration to the soil.

5.28.5 Evidence of Releases and Potential Environmental Impacts

Indications of releases at this SWMU were not observed during the SR and Kleinfelder did not find documentation of releases occurring in this area. The waste management practices employed and the characteristics of this SWMU result in a reduced potential for release and environmental impact.

5.28.6 Analysis of Release Prevention or Mitigation Measures

This SWMU appeared to have adequate capacity for the liquid wastes present during the SR. The release prevention methods employed at this SWMU include the containerization of the wastes. Initial containment in individual containers intended for the waste product followed by double containment in a vermiculite packed drum (lab-pack) reduces the potential for releases.

5.29 Satellite Accumulation Point - AP Maintenance Shop

5.29.1 Unit/Area Design and Operational History

SWMU KMCC-029 is a satellite accumulation point for hazardous waste resulting from a solvent based parts washer in the AP maintenance shop. This SWMU is located inside the AP maintenance shop, along the south wall, within the fenced and guarded KMCC facility. This area consists of a concrete floored and walled maintenance shop, a solvent based parts washer, and a drum for temporary storage of parts washer waste (Reference Map 29).

This SWMU has been in use since 1989. A closed circulation, solvent based parts washer is used for cleaning oil and grease from valves, fittings, and other items requiring maintenance. The oil and grease containing 1,1,1-TCA accumulates in the bottom of this parts washer and is periodically withdrawn and placed in a drum stored next to the parts washer (Reference K357).

An SR of this SWMU was conducted on August 20, 1991. On that day, the area was clear of miscellaneous objects and well maintained. The parts washer was bright red and easily noticed. The concrete floor and block walls in the vicinity of the parts washer were intact and cracks were not observed. Minor drippage was noted onto the floor beneath the parts washer. On the day of the SR, a parts washer waste drum was not present within the parts washer area. Surface water run-on or run-off is not an apparent factor for this SWMU because it is within the AP maintenance shop building.

A 55-gallon drum containing parts washer waste was noted in the product storage area outside of the AP maintenance building and stored on a plastic pallet next to new 1,1,1-TCA solvent. This product storage area was approximately 150 feet west of SWMU KMCC-029 and within a soil surfaced area.

5.29.2 Unit/Area Waste Characteristics

The waste managed in this area is an oily sludge resulting from parts washing operations and containing oil, grease, and 1,1,1-TCA. This waste is considered hazardous due to the presence of 1,1,1-TCA. The chemical characteristics of 1,1,1-TCA (a chlorinated solvent) are described on the applicable MSDS (Reference K033).

5.29.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. However, the waste material is regulated as a satellite accumulation of a hazardous waste under 40 CFR Section 262.34.

5.29.4 Waste Constituent Migration Pathways

The waste generated by this parts washer is containerized and typically stored within the same concrete floored building. The migration pathways are to the concrete floor and the air.

5.29.5 Evidence of Releases and Potential Environmental Impacts

The SWMU is contained within the concrete floored and walled building. On the day of the SR, a small area of minor drippage from the parts washer was observed on the concrete floor beneath the parts washer.

A small area of minor soil staining was also observed near the base of the drum containing parts washer waste at the product storage area to the west of this SWMU. This stain was approximately two feet in diameter. Correlation between this stain and the parts washer waste could not be made. The product and waste drums observed during the SR appeared undamaged and in good condition.

Documentation of historic releases from this SWMU was not found during this study.

5.29.6 Analysis of Release Prevention or Mitigation Measures

This parts washer uses a closed circulation system and is equipped with a lid which, when closed, reduces emissions of volatile constituents.

The release prevention methods employed in this area include containerization of parts washer sludge from the point of generation to the point of disposal (recycling). Mitigative measures include prompt clean-up of spills when these occur (Reference K357).

5.30 Storm Sewer System

5.30.1 Unit/Area Design and Operational History

The storm sewer system (SWMU KMCC-030) is depicted on Plate 7-1. The storm sewer system comprises a network of concrete and clay tile storm drains (subsurface pipes), manholes (drop inlets), and outfalls (discharge points). This drainage system provided a means to manage both storm water and industrial effluent. The storm sewer system was constructed of several smaller networks. Each network drained discrete portions of the BMI complex and discharged through different outfalls. The outfalls occur along the Beta Ditch, tributaries to the Beta Ditch, and other drainage ditches (Reference K178, UL020). This system was installed during construction of the original BMI complex in 1941 and 1942 (Reference K178, UL001, UL020). The storm sewer system has been used between approximately 1941 and January 1976 to convey storm water and process effluent from throughout the southern portions of the site to the Beta Ditch.

With regard to the KMCC property, run-off from storm events historically would follow the local topography, enter a nearby drop inlet, and follow the storm drain to an

outfall. Effluent from many of the processes was also conveyed through the storm sewer to an outfall. The storm water and effluent exiting the outfall entered the Beta Ditch and were conveyed to the upper and lower BMI ponds. This type of use continued until prior to January 1976 when KMCC attained "zero discharge" industrial wastewater discharge status (Reference K178, K265, K277, K347, UL020).

The storm sewer system also historically conveyed effluent from the U.S. Lime facility (now owned and operated by Chemstar) and also would have received storm water flows from Stauffer, Jones Chemical, and Timet (Reference K265). An April 18, 1980 letter from Flintkote (operating at the facility now owned and operated by Chemstar) to the U.S. EPA indicated that a reclaim tank was installed in 1979 and process related liquids no longer were discharged to the storm sewer (Reference UE072).

The storm sewer system serving KMCC property is currently used for the management of storm water and once through non-contact cooling water. Process wastewaters and fluids are currently conveyed throughout the KMCC facility by a system of surface and subsurface pipelines to on-site lined SIs. As an added margin of safety, many of the storm drains located in, or near, process areas have been sealed or retrofitted with a protective berm to reduce the possibility that wastes, process fluids, or process area contaminated storm water run-off would accidentally enter the storm sewer system (Reference K158A, UE028; SR, August 19, 1991).

5.30.2 Unit/Area Waste Characteristics

Use of the storm sewer system on the KMCC site has changed over time. This system was initially used to convey storm water and process effluent from throughout the southern portion of the site to the Beta Ditch from approximately 1941 through 1976. Between 1945 and January 1976, the effluent included wastes from the chlorate, perchlorate, elemental boron and leach plant processes. Between 1945 and February 1975, the waste included slurried sodium chlorate filter cake containing 0.05% by weight hexavalent chromium (Reference K037, K039, K056, K265, K266).

By January 1976, KMCC had attained "zero discharge" and the storm sewer system was no longer used to convey process effluent or wastewaters. Since January 1976, the storm sewer system has been used by KMCC to routinely convey only storm water and once through non-contact cooling water to the Beta Ditch (Reference K158A, K178, K265, K277, UL020).

The storm sewer system also historically conveyed effluent from the U.S. Lime facility (now owned and operated by Chemstar). An April 18, 1980 letter from Flintkote (operating at the facility now owned and operated by Chemstar) to the U.S. EPA indicated that a reclaim tank was installed in 1979 and process related liquids no longer were discharged to the storm sewer (Reference UE072).

The system historically also received storm water flows from Stauffer, Chemstar, State Industries, Jones Chemical, and Timet (Reference K265).

5.30.3 Regulatory Status of Unit

Discharge from the storm sewer system into the Beta Ditch has been regulated under NDEPS Permit #NV0000078 since the early 1970s (Reference K 158A, K305, K320). Two sampling points are maintained for the system at discharge outfalls to its Beta Ditch. Kleinfelder did not find records of known releases from the storm sewer system other than the designated discharge to the Beta Ditch. Current discharges are reported to the NDEP in monthly discharge reports (Reference K158A).

5.30.4 Waste Constituent Migration Pathways

The potential pathways for migration of waste constituents associated with the storm sewer system are soil, surface water, or groundwater.

Releases to the soil could have occurred if contaminants were present in the waters conveyed by the storm sewer system. They could be discharged to surface water of the Beta Ditch during the infrequent flow events of that ditch. Eventual discharge to Las Vegas Wash is possible.

5.30.5 Evidence of Releases and Potential Environmental Impacts

Prior to 1976, the storm sewer system was a partial contributor to the effluent discharged to the Beta Ditch. As such, a portion of the constituents listed in the report to the EPA by KMCC (see Table 5.20.1) are attributable to the storm sewer system.

Review of the August 2, 1979 aerial photography revealed the presence of a yellow liquid effluent discharging from the western storm sewer outfall into the Beta Ditch and being conveyed to Las Vegas Wash (Reference K164). The source, nature and duration of this effluent discharge is not known.

5.30.6 Analysis of Release Prevention or Migration Measure

The major release prevention measure was the rerouting of process waste streams away from the storm sewer system and into the on-site lined SIs. Storm drains within production areas were sealed and drains in proximity to process areas are bermed to reduce the possibility of wastes, process fluids, or process area contaminated storm water from accidently entering this system (Reference K158A, UE028, SR, August 12, 1991).

Additionally NDEPS sampling points are located at the two outfalls (001, 002) where the storm sewer system discharges to the Beta Ditch.

5.31 Acid Drain System

5.31.1 Unit/Area Design and Operational History

The acid drain system (SWMU KMCC-031) extends to most parts of KMCC property. The extent of the system is illustrated on Plate 7-2. The system further extends to most manufacturing facilities on the entire BMI complex.

The acid drain system comprises a network of pipes, manholes, and sumps used as a means to collect acid effluent from throughout the BMI complex. The construction included the use of acid-resistant materials (Reference K163, K164). The system had a single outfall at the acid effluent neutralization plant (See Plate 7-2).

The acid effluent was originally neutralized prior to disposal in the "Trade Effluent" disposal ponds using waste caustic liquor from the chlorine plant. This practice was discontinued when the caustic line disintegrated. From that time on, acid waste was apparently discharged directly to the "Trade Effluent" evaporation/settling ponds without neutralization (Reference UL020).

Acid effluent entered the acid drain system from the following areas during the time the BMI complex was operated by the U.S. Government for magnesium production (Reference N009, K163):

- o the chlorine plant;
- o the preparation building;
- o the flux plant and neutralization area; and
- o each of the ten chlorination buildings and associated electrolysis buildings.

The acid drain system was utilized from the time magnesium oxide processing began at the BMI complex (sometime in 1941 or 1942) through the time the plant was closed on November 15, 1944 (Reference UL001). Use of the acid drain system after November 15, 1944 is not well documented.

The acid drain system was apparently used by several companies to discharge various wastes from approximately 1945 through January 1976. A portion of this system carried effluents from the basements of Units 1 through 5 (Reference K265). In this regard, this branch also could have carried effluents from State Industries, a Timet shop, Jones Chemical, a Stauffer office building, and U.S. Lime (operating at the facility is now owned and operated by Chemstar (Reference K265). Another portion of the acid drain system provided drainage from Unit 6 and various portions of Timet property (Reference K265).

A March 16, 1984 letter from KMCC to the NDEP indicates that the KMCC acid drain system was plugged many years ago and that the basement drains in Units 4 and 5 were being sealed with concrete in March 1984 (Reference K092).

5.31.2 Unit/Area Waste Characteristics

The specific wastes conveyed by the acid drain system include the following:

- o caustics (presumed to be sodium hydroxide) (Reference K037);
- o acid process liquors (hydrochloric acid solutions) (Reference UL020); and
- o dilute magnesium chloride solutions.

Between approximately 1945 and January 1976, the acid drains received flows at least from the following (Reference K265, K277, K298, K300, K301, K302, UE103, UE114):

- acid spills from within an acid storage tank area;
- spills and seeps in the basements of Units 4 and 5;
- potassium chlorate and perchlorate solutions from Unit 4;
- condensate from various steam traps, water from drinking fountains and washwater from trenches along the north wall of the cell floor in Unit 5;
- brine rinse and washwater from water softeners;
- neutralized and unneutralized waste cyanide solution from State Industries; and
- pickling process wastes from State Industries process line and a surface impoundment which was periodically drained to access liner leaks and allow repairs;
- effluent from drains in the basement of Units 1 through 5; and
- chromium bearing solutions from the basement of Unit 6 plus effluent from Time.

5.31.3 Regulatory Status of Unit

Kleinfelder did not find documentation regarding any special regulatory status for this area. The liquid effluent discharges to this area during U.S. Government operations were probably not specifically regulated.

A March 16, 1984 letter from KMCC to the NDEP indicates that the KMCC acid drain system was plugged many years ago and that the basement drains in Units 4 and 5 were being sealed with concrete in March 1984 (Reference K092). Based on this information, the system appears to be sealed in-place.

5.31.4 Waste Constituent Migration Pathways

Three of the migration pathways, soil, surface water or groundwater could have been waste constituent pathways associated with the acid drain.

Releases to the soil could have occurred due to breakage of the liner pipe or from leakage at joints and connections. If releases occurred on an on-going basis, migration to the groundwater is possible.

If contaminants were present in the waters conveyed by the storm sewer system, they could be discharged to surface water of the Beta Ditch during the infrequent flow events of that channel. Eventual discharge to Las Vegas Wash is possible.

A review of July 11, 1950 aerial photography (Reference K164) indicates that the pipe which conveyed waste from the neutralization plant to the "Trade Effluent" evaporation/settling ponds had been removed. Discharges from the acid drain system, after this pipe was disconnected, would have followed surface drainage patterns and entered the Beta Ditch (Reference K161, K164; SR, August 20, 1991).

5.31.5 Evidence of Releases and Potential Environmental Impacts

Documented discharges due to pipeline breakage or leakage from joints or connections of the acid drain system were not found.

The acid drain system discharged first neutralized and later unneutralized acid solutions to the Trade Effluent ponds. Therefore the historic releases to the soil and groundwater attributable to that SWMU (KMCC-014), described in Section 5.14.5, are in part attributed to the acid drain system.

Apparent discharge to the Beta Ditch may have occurred after the pipeline between the Trade Effluent ponds and the neutralization plant was removed and before the acid drain system was sealed. Therefore historic discharges to that SWMU (KMCC-020), described in Section 5.20.5, are in part attributable to the acid drain system.

5.31.6 Analysis of Release Prevention or Mitigation Measures

KMCC has prevented releases both to and by the acid drain system by removing it from service.

A March 16, 1984 letter from KMCC to the NDEP indicates that the KMCC acid drain system was plugged many years ago and that the basement drains in Units 4 and 5 were being sealed with concrete in March 1984 (Reference K092). Based on this information, the system appears to be sealed in-place.

CHAPTER 6.0
RELEASE

6.0 KNOWN OR SUSPECTED RELEASES OR SPILLS

General

Section 6.0 addresses areas of known spills or releases associated with KMCC and tenant equipment and production related activities. Twenty such areas are discussed in this section. The basis information for identifying these areas was obtained from a review of documents, interviews, and site reconnaissance. Each subsection provides the following information on the equipment or production activity associated with the spill or release:

- description of the spill or release;
- a description of the response measures;
- contaminant migration pathways; and
- evidence of existing environmental impact.

6.1 PCB Transformers

6.1.1 Description of Spill/Release

Background

The KMCC facility currently has 12 PCB containing transformers (Reference K260). The 1980 annual PCB report indicates that at one time there were 22 PCB containing transformers located at various areas within the KMCC facility (Reference K261).

KMCC records indicate that there has been one reportable quantity release of PCB containing fluids from management of these transformers. The reportable quantity (RQ) for PCBs is one pound. The release occurred in November 1990, and was promptly reported to the appropriate regulatory agencies. Cleanup activities were initiated immediately (Reference K321).

Spill/Release

On November 26, 1990, approximately 1.75 pounds of PCB containing fluid (Inerteen) was released within a concrete area beneath the sub 50 (KMCC Transformer # 52) transformer. This transformer was located within Unit 5 on the ground floor (Reference Map 6-1; Grid D4-19). The release occurred from a ceramic seal which cracked during removal of an associated rectifier. The released fluid dripped through access holes and collected on the concrete floor in the basement of Unit 5 (Reference K260, K321; SR, September 9, 1991).

6.1.2 Analysis of Response Measures

The released fluid was cleaned up with absorbents and the fluid in the transformer was evacuated to a level below the crack in the seal. The PCB containing fluid removed from the transformer and the material from clean-up activities was placed into 55-gallon drums in controlled storage awaiting disposal (Reference K321).

Laboratory analyses of wipe samples of the concrete after the initial clean up was completed revealed that elevated concentrations of PCBs were still present (Reference K346). KMCC subsequently removed the contaminated concrete. The concrete in this area was approximately eight inches thick and presented a relatively impervious barrier to the oil. A small amount of soil beneath the concrete was also removed in August 1991 as preparation for replacing the concrete flooring (Reference K340, K341). The soil removed with the concrete was incidental to the concrete removal. This material was disposed off-site at U.S. Ecology, Beatty, Nevada as indicated by the 1991 annual PCB report.

6.1.3 Contaminant Migration Pathways

The contaminant migration pathway for this spill included the concrete surface. The obviously impacted concrete was removed. Some soil immediately underlying the concrete was also removed (Reference K340, K341).

6.1.4 Evidence of Existing Environmental Impacts

Kleinfelder did not observe environmental impacts related to this release. The area in the basement below the former transformer had been repoured with new concrete prior to a September 9, 1991, SR.

6.2 Unit 1 Tenants - Stains

6.2.1 Description of Spill/Release

Background

Portions of the Unit 1 Area (Reference Map 6-1; Grid D1-6) have been leased to tenants for various business activities. Ebony Construction Company leased the subject Unit 1 Area in 1977 and 1978 and performed construction related support services near the Unit 1 large garage type openings in the north wall (Reference K357). Kleinfelder did not find documentation or evidence of truck washing, vehicle refueling, or waste disposal activities that are sometimes associated with construction related activities (Reference SR, September 9, 1991).

Spills/Releases

Two stained soil areas are present immediately north of Unit 1 and appear to be typical of motor oil or diesel fuel dripping from parked vehicles possibly associated with tenant activities. The stained areas, one approximately 10 feet by 10 feet and a second stain of approximately 2 feet by 10 feet, are located approximately 3 to 5 feet north of the Unit 1 building, near a large access opening in the center of the north wall (Reference; SR, September 9, 1991).

6.2.2 Analysis of Response Measures

Kleinfelder did not find documentation or other evidence of a response action to hydrocarbon spills in this area.

6.2.3 Contaminant Migration Pathways

Petroleum hydrocarbons are present in the surface soils. The primary migration pathways are by surface runoff or infiltration into subsurface soils and groundwater.

6.2.4 Evidence of Existing Environmental Impacts

The observed environmental impact is stained surface soil typical of drippage from crankcase or fuel leakage of parked vehicles.

6.3 Unit 2 Salt Redler

6.3.1 Description of Spill/Release

Background

A rubber belt conveyor (Redler brand conveyor) is used to load salt (NaCl) into rail cars at a rail siding adjacent to the southwest corner of Unit 2 (Reference Map 6-1; Grid D4-11). Transfer of salt from storage in Unit 2 to the conveyor feed hopper is accomplished by front end loader. The conveyor has been in operation since January 1990 (Reference K357).

Spill/Release

During loading operations, some salt spills to the ground as a result of routine loader and conveyor operations. Following loading, spilled salt is swept up and returned to storage in Unit 2 (Reference K357).

6.3.2 Analysis of Response Measures

Kleinfelder did not observe indications of significant spills or releases at the time of a September 9, 1991 site reconnaissance. This observation supports the effectiveness of management practices to sweep the area to reduce the chance for environmental impacts.

6.3.3 Contaminant Migration Pathways

The contaminant migration pathways include air, surface water, soil, and groundwater. High winds and gusts of winds during loading operations could provide a pathway for dispersal to other areas. Rainwater could dissolve the salt and transport the solution to subsurface soils and nearby storm sewers. The storm sewers discharge to the Beta Ditch through the KMCC NPDES monitoring stations (Reference K158A, K178).

6.3.4 Evidence of Existing Environmental Impacts

Kleinfelder did not find documentation or other evidence of environmental impacts related to salt spillage from the Unit 2 Salt Redler operation.

6.4 Unit 4 and Unit 5 Basements - Consent Agreement

6.4.1 Description of Spill/Release

Background

Sodium chlorate was produced in electrolytic cells located in Units 4 and 5 from 1945 to November 1989. The location is shown on Map 6-1 (Grid D2, D3-16, 17, 20). Additionally, the eastern portion of Unit 5 has been used to produce sodium perchlorate from 1945 to present. The sodium chlorate and sodium perchlorate electrolytic processes utilize sodium dichromate (hexavalent chromium) in the process solutions (Reference CA017).

On September 9, 1986, KMCC and the NDEP entered into a consent agreement for remediation of groundwater contaminated with hexavalent chromium (Reference K304). A 1985 hydrogeological report prepared by KMCC indicated that the chromium contamination in groundwater beneath the KMCC site originated from leakage of process solutions from the basements of Units 4 and 5 (Reference K167).

Spill/Release

The concrete basements of Units 4 and 5 were used for many years as sumps to collect sodium chlorate and sodium perchlorate process liquor, spillage, and washwater. Deterioration and cracking of the concrete floors resulted in release of some of these liquids to underlying soils and groundwater (Reference K091).

6.4.2 Analysis of Response Measures

Operation of the former sodium chlorate electrolytic cells in Units 4 and 5 has been discontinued. Sodium perchlorate continues to be produced in the eastern portion of Unit 5.

Remedial activities have included concrete sealing, repair of the basement floors (conducted in 1983 and 1984), and strengthening of operational procedures in 1986 to further reduce and control spillage (Reference K091, K092, K105, K146A, ND049).

The basement areas were not managed as disposal areas, and therefore sludge did not accumulate in these areas. During decommissioning of the plant minor amounts of floor rubble (concrete) were removed and disposed off-site at U.S. Ecology's Beatty, Nevada facility.

The groundwater contaminant plume geometry has been evaluated and a groundwater interception, treatment, and reinjection system has been installed (Reference K167, K304). The remediation program is the subject of continued monitoring and reporting to the NDEP (Reference K304).

6.4.3 Contaminant Migration Pathways

The contaminant migration pathway is to soils and shallow groundwater beneath Units 4 and 5 (Reference K091, K167). The resultant plume is migrating in a north-northwesterly direction in the shallow groundwater (Reference K167).

6.4.4 Evidence of Existing Environmental Impacts

The hexavalent chromium plume extends greater than 4,000 feet downgradient (to the north) of Units 4 and 5 (Reference K167). A network of sampling and interception wells was installed to monitor and intercept the plume for treatment. The intercepted groundwater is pumped, treated to remove chromium, and then reinjected downgradient of the intercept line (Reference K304; Section 5.19 of this report). The effectiveness of the groundwater remediation program is periodically reported to the NDEP in accordance with the September 9, 1986 consent agreement.

6.5 Unit 6 Basements - Remediation Project

6.5.1 Description of Spill/Release

Background

High purity, battery active manganese dioxide has been produced in electrolytic cells in Unit 6 from 1951 to present (Reference Map 6-1; Grid D2, D3-22, 23). The basement

of Unit 6 had been used to collect process spillage and washwater from the manganese dioxide operations (Reference K249). Based on a hydrogeological report prepared by KMCC in 1985, KMCC and the NDEP entered into a Consent Order on September 16, 1986 to address environmental impacts attributed to the spillage and release of process solutions to the ground. This Consent Order related to initiation of remediation activities required to mitigate the source of a plume of high conductivity groundwater originating from Unit 6 (Reference K146C).

Spill/Release

During operation, the electrolytic cells occasionally overflowed resulting in spillage of manganese sulfate solution to the basement area. As the floor deteriorated and fractured, spilled solutions percolated into the underlying soils and groundwater. The manganese sulfate solutions percolating through the soils are responsible for soil swelling and concrete heaving in the basement slabs and footings. Groundwater contamination in the area is described as a plume of high conductivity groundwater and the source has been traced to the basement of Unit 6 (Reference K146A, K146C, K249).

6.5.2 Analysis of Response Measures

The basement area was not managed as a disposal area, and therefore, sludge did not accumulate in this area. KMCC initiated and maintains several remediation measures which were started in 1986 to address existing contamination and to eliminate further contamination of the groundwater from sources within Unit 6. The basement was cleaned, the concrete floor removed, and the soil recontoured. The removed debris was disposed in the manganese dioxide tailings area. The basement area was then lined with a 100 mil. high density polyethylene (HDPE) liner across floor areas and 8 to 10 inches up the walls and foundations. The liner system installation was completed in December 1987 (Reference K249; SR, September 9, 1991).

Ongoing operational measures include routine visual checks of the basement area for standing solutions or leaks. When found, liquids are pumped back to solution storage. Additionally, periodic leveling checks and adjustments of the electrolytic cells

(weekly) and anolyte headers (quarterly) are made to reduce the potential for spills due to elevation and leveling problems (Reference K146A, K146C).

The integrity of the basement liner system is periodically checked and serviced. The results of the liner servicing are reported to the NDEP in Annual Discharge Monitoring reports (DMRs) such as the December 1989 DMR (Reference K320).

6.5.3 Contaminant Migration Pathways

The contaminant migration pathway is to soils and shallow groundwater beneath Unit 6 (Reference K146A, K146C, K167). The resultant plume is migrating in a north-northwesterly direction in the shallow groundwater and co-mingles with the chromium plume associated with Units 4 and 5 (Reference K167).

6.5.4 Evidence of Existing Environmental Impacts

Existing impacts include manganese sulfate contaminated soil and high TDS groundwater (Reference K146C). The groundwater impact is evidenced by a plume of high conductivity which originates beneath Unit 6 (Reference K167).

6.6 Diesel Storage Tank Area - Stains

6.6.1 Description of Spill/Release

Background

The diesel fuel storage tank area has been in use since the early 1940s (Reference N009, N011). The area includes a 500,000 gallon storage tank and an estimated 18,000 gallon overflow tank. Each above ground storage tank (AGST) rests within its own bermed area. These AGSTs are located north of the Chemstar facility (Reference Map 6-1, Grid C4-14 and SR, September 9, 1991).

Spill/Release

Kleinfelder did not find records of spills in this area. However, soil staining was observed around approximately 30 percent of the base area of the storage tank and the

presence of characteristic diesel fuel odor was noted during a September 9, 1991 SR. Soil staining was not noticeable near the overflow tank which is located immediately northwest of the main storage tank (Reference SR, September 9, 1991).

6.6.2 Analysis of Response Measures

Moats are present near the base of the tanks and consist of channels approximately eight inches wide and one to four inches deep with a slope to a low point where drain valves are located. Signs of recent tank leakage (fuel oil) were not present in the moats. Response measures appear to be adequate with the exception that stained soils near the base of the storage tank have not been removed (Reference SR, September 9, 1991).

A Spill Prevention, Control, and Countermeasures (SPCC) Plan is in place for this tank facility (Reference K357).

6.6.3 Contaminant Migration Pathways

The contaminant migration pathway is to soil and potentially to groundwater.

6.6.4 Evidence of Existing Environmental Impacts

The presence of soil staining and diesel odor indicates that there has been some localized environmental impact (Reference SR, September 9, 1991).

6.7 Former Old Main Cooling Tower and Recirculation Lines

6.7.1 Description of Spill/Release

Background

The old main cooling tower was approximately 50 feet high and 700 feet long, constructed of redwood, and located north of the manganese dioxide process Leach Plant (Reference Map 6-1, Grid C2-18 to 23). This tower was operated from 1941 until September 1989. The cooling tower was demolished in October 1989 (Reference K339, N009, N011).

During its operation, the tower served the needs of the BMI complex and in later years served the cooling needs of KMCC and Timet. Timet discontinued use of this cooling source in approximately July/August 1986 following installation of their own cooling system (Reference K146A).

Spill/Release

Prior to 1989, the old main cooling tower experienced several recirculation water upsets which resulted in discharge of high conductivity water to the Beta Ditch. These discharges were routinely reported to the NDEP in accordance with KMCC's NPDES permit. During the period of September 20, 1984, through February 11, 1986, KMCC reported 23 such discharges from the cooling tower to the Beta Ditch (Reference ND048).

The causes of the recirculating water discharges typically included:

- power failure due to a storm event (Reference K034, K146A);
- increase in the volume of water returned to the cooling tower from unknown sources (Reference K326, K330);
- the addition of stabilized water in the cooling water return from Timet due to sources including emergency cooling water for Timet's scrap furnace (Reference K327, K329, K332, K333); and
- increase in the volume of water in the cooling tower from unknown sources. Contributing factors may have included: (1) a reduced heat load due to a cutback in sodium chlorate production; and (2) cooler weather (Reference K331).

Individual discharges varied in length from a few hours to several days. The estimated amount of discharged water was reported to the NDEP along with the analytical results for pH, conductivity, sodium chloride, zinc, and phosphate (Reference K326, K327, K328, K329, K330, K331).

Prior to January 1976, the flow path was through the Beta Ditch and on to the BMI ponds. Between January 1976 and June 1985, the flow path was to the Las Vegas Wash via the Beta and Alpha Ditches or was routed to the BMI ponds. In June 1985,

the Pittman area bypass pipeline was completed and subsequent non-industrial process discharges went through the Beta Ditch and the Pittman bypass pipeline to the Las Vegas Wash (Reference K034, K158A, UB001, UB018).

KMCC records also indicate one other discharge related to the old main cooling tower. On May 10, 1980, sodium chlorate process solution entered the recirculating water system as a result of a sudden gasket failure on an associated heat exchanger. Due to safety concerns associated with chlorate potentially impregnating the wood, approximately 500,000 to 600,000 gallons were purged from the tower. The purged water, containing approximately 50 to 75 tons of chlorates and dissolved solids (including between 1,000 to 1,300 pounds of sodium dichromate), was routed to the upper BMI ponds via the Beta Ditch. This discharge was reported to the NDEP (Reference K038).

6.7.2 Analysis of Response Measures

Response measures conducted by KMCC during cooling tower recirculation water upsets included (Reference K326, K327, K328, K329, K330, K331):

- o assessment of the cause of the upset;
- o mitigation of the cause when identified; and
- o reporting the discharge to the NDEP.

Additionally, discharges were often routed to the upper BMI ponds to avert discharge directly to the Las Vegas Wash (Reference K034, K038).

Other response measures conducted by KMCC between 1985 and 1989 included (Reference K146A):

- o installation of alarms to warn staff of power loss to the recirculation pump and high level indicators for recirculating water; and
- o initiation of an inspection/notification/sampling procedure wherein staff routinely inspected routinely inspected and monitored the coo

The companies sharing this cooling tower constructed separate towers for their specific needs. The old cooling tower was removed from service in September 1989, demolished, and sent to off-site disposal (Reference K339, K357). Some foundations remain in place and can be observed in the vicinity of the manganese tailings pile north of the Manganese Leach Plant (Reference SR, September 9, 1991).

6.7.3 Contaminant Migration Pathways

Discharges were through surface drainages (The Beta Ditch and Alpha Ditch). Some infiltration may have occurred to soils within the drainage. Contaminants would consist of dissolved salts contained in the tower feed water (stabilized water from Lake Mead), which were concentrated as evaporation occurred during cooling.

6.7.4 Evidence of Existing Environmental Impacts

The environmental impacts of historic main cooling tower discharges are related to infiltration of recirculated cooling water along the surface drainages and discharge to either the upper BMI ponds or the Las Vegas Wash.

6.8 Leach Plant Area Manganese Ore Piles

6.8.1 Description of Spill/Release

Background

Manganese ore has been stored and processed on-site since WECCO initiated electrolytic manganese dioxide production in 1951. Manganese ore has historically been stored in piles located in a rectangular shaped area near the Leach Plant (Reference Map 6-1, grid coordinates C9-20 to C6-20 to C6-23 to C9-23). The two manganese ore storage piles observed during the SR were long and narrow; measuring approximately 10 to 15 feet high and over 300 feet long. The ore was stored on the ground and was black in color. The manganese ore typically ranged in size from approximately 1/2 to 1 inch in diameter (gravel size). The larger size ore was used to significantly reduce the chance for generation and dispersal of fines (Reference SR, September 10, 1991).

The manganese ore routinely assays greater than approximately 55 percent (by weight) manganese dioxide (MnO_2) and is the starting raw material in the beneficiation process ending with the electrolytic production of high purity, battery active manganese dioxide (Reference K165).

Spills/Releases

Manganese ore has been scattered on the ground throughout the Leach Plant area as a result of 40 years of operational activities. The scattering of manganese ore is primarily the result of spillage during loading activities, spillage during transport from one operational area to another, and some dispersal of fines by the wind (Reference SR, September 10, 1991).

Precipitation from infrequent rains can contact the ore piles and scattered ore. The manganese in the unprocessed ore and tailings is not readily soluble in water, therefore the likelihood of rainwater leaching significant quantities of manganese from this material is remote (Reference K037).

6.8.2 Analysis of Response Measures

As noted above, KMCC reduces the potential for wind-blown releases of manganese ore by importing specific size ore; e.g., gravel size. The manganese ore size currently imported is large enough so as not to be easily wind-blown or readily form a dust.

6.8.3 Contaminant Migration Pathways

The primary pathway is to surface soil in the Leach Plant area and to a lesser degree, the air and surface water run-off.

6.8.4 Evidence of Existing Environmental Impacts

Manganese ore has been stored and beneficiated in this area since 1951. Manganese ore was observed throughout the Leach Plant area during a September 10, 1991, SR. Manganese ore is a naturally occurring material and is nonhazardous in nature; i.e. the manganese and some other trace compounds are not readily soluble in water (Reference K111). Table 6.8.1 lists an analysis of the manganese ore, including these trace compounds (Reference K165).

Table 6.8.1.
Analysis of Manganese Dioxide Ore

	Dried at 105°C		
Manganese Dioxide (MnO_2)	75.65 %	Total Manganese (Mn)	50.73 %
Manganese Mono-oxide (MnO)	3.77 %		
Ferric Oxide (Fe_2O_3)	4.73 %	Iron (Fe)	3.31 %
Silica (SiO_2)	2.63 %		
Alumina (Al_2O_3)	6.14 %		
Phosphorus Pentoxide (P_2O_5)	0.257 %	Phosphorus (P)	0.112 %
Lime (CaO)	0.09 %		
Magnesia (MgO)	0.07 %		
Sodium Oxide (Na_2O)	0.03 %		
Potassium Oxide (K_2O)	0.86 %		
Barium Oxide (BaO)	0.24 %		
Titania (TiO_2)	0.24 %	Titanium (Ti)	0.144 %
Vanadium Pentoxide (V_2O_5)	0.020 %	Vanadium (V)	0.011 %
Cupric Oxide (CuO)	0.068 %	Copper (Cu)	0.054 %
Lead Mono-oxide (PbO)	0.004 %	Lead (Pb)	0.004 %
Zinc Oxide (ZnO)	0.079 %	Zinc (Zn)	0.063 %
Cobaltic Oxide (Co_3O_4)	0.136 %	Cobalt (Co)	0.100 %
Nickel Mono-oxide (NiO)	0.065 %	Nickel (Ni)	0.051 %
Molybdenum Trioxide (MoO_3)	0.005 %	Molybdenum (Mo)	0.003 %
Chromium Sesquioxide (Cr_2O_3)	0.010 %	Chromium (Cr)	0.007 %
Arsenic Trioxide (As_2O_3)	0.009 %	Arsenic (As)	0.007 %
Tungsten Trioxide (WO_3)	LT 0.002 %		
Tin Dioxide (SnO_2)	LT 0.002 %		
Combined Water (H_2O)	4.98 %		
Carbon Dioxide (CO_2)	0.06 %		
Sulphur Trioxide (SO_3)	0.055 %	Sulphur (S)	0.022 %

Note: Sample weighed at 105°C; moisture content = 8.56 % (as calculated from cargo results).

LT - Not Detected, less than concentration indicated.

Reference K165.

6.9 Leach Plant Area Anolyte Tanks

6.9.1 Description of Spill/Release

Background

The manganese ore is beneficiated in a series of steps including calcining to produce manganese oxide, milling the calcine, and leaching to produce a concentrated manganese sulfate solution. The concentrated manganese sulfate solution produced at the Leach Plant is pumped to the electrolytic cells in Unit 6 where electrolytic manganese dioxide is plated out of solution. Following electrolysis, the manganese sulfate/sulfuric acid solution (termed the anolyte solution) is then gravity drained, with auxiliary pump support, to one of two anolyte storage tanks. The anolyte solution is recycled and reconcentrated in Leach Plant related operations (Reference K253).

There are two anolyte solution storage tanks constructed of rubber-lined or fiberglass-lined carbon steel. Both tanks rest directly on the ground. The temperature of the anolyte solution in the tanks is slightly above ambient and the pressure is atmospheric due to the open top design of the tank (Reference K168, ND009; SR, September 10, 1991).

The anolyte tanks are believed to have been installed by WECCO between 1950 to 1953 during construction of the pilot plant or production plant. The two anolyte tanks are located at grid coordinates C7-19 and C6-19, respectively, on Map 6-1 (Reference SR, September 10, 1991). These tanks are currently in the process of being replaced with new tanks (Reference SR, February 20, 1992).

Spills/Releases

The anolyte tanks have been the source of several releases throughout the life of their use (Reference ND009). The anolyte solution contains sulfuric acid causing the solution to be classified as a hazardous substance (Reference K070). Due to the anolyte solution's corrosive nature, holes have developed in the tank's sides, bottom walls, and rubber lining, leading to leaks.

A review of the KMCC files has revealed instances in which both reportable and non-reportable quantity releases have occurred from the anolyte tanks. The RQ for sulfuric acid is 1,000 pounds (Reference K173).

The following are documented releases on file:

- o January 16, 1983; approximately 125,000 gallons of anolyte solution was released over a 24-hour period (Reference *K070A*, K170);
- o July 6, 1985; anolyte solution containing 100 gallons of sulfuric acid was released (Reference K168, K170);
- o April 27, 1989; a 1/2-inch hole developed in anolyte tank releasing less than 864 pounds of sulfuric acid (Reference K172); and
- o September 5, 1989; approximately 5,000 gallons of anolyte solution containing approximately 204 pounds of sulfuric acid was released (Reference K173).

6.9.2 Analysis of Response Measures

KMCC's release response actions routinely included one or more of the following (Reference K70A, K173):

- o diking using manganese tailings to contain the spill. The tailings act as both an absorbent and a neutralizing agent because they have a pH of approximately 8-9. The tailings dikes were then returned to the on-site tailings pile;
- o neutralizing with lime/soda ash. The lime or soda ash is added directly to the spilled liquid;
- o pumping the solution to another anolyte storage tank;
- o diverting the flow of anolyte solution from the Unit 6 cells;
- o increasing the flow of anolyte from the leaking tank to the Leach Plant area. This action, in combination with the previous action (flow diversion), serves to reduce the amount of liquid in the tank;
- o notifying appropriate regulatory agencies of the release and mitigative actions taken; and
- o repairing the tank or system that leaked.

A review of the KMCC file documents revealed that prior to 1985, neutralizing agents were not applied to the released solution. The area was diked and the alkaline nature of the soil was depended upon for neutralization (Reference K170A). In later years,

neutralizing agents (such as lime or soda ash) were added to spills in this area (Reference K104, K140A). The addition of neutralizers as a response measure for the more recent spills/leaks appears to be appropriate for the initial mitigation.

As part of a long term response, KMCC is in the process of replacing the existing anolyte tanks with new tanks (Reference SR, February 20, 1992).

6.9.3 Contaminant Migration Pathways

Anolyte solutions (containing sulfuric acid) leaking from anolyte tanks have impacted the surrounding soils. Because early spills and leaks of anolyte solution were addressed through natural neutralization by the soils (caliche), there is potential for groundwater to be impacted by anolyte solution constituents (Reference K170, ND009; SR, September 10, 1991).

6.9.4 Evidence of Existing Environmental Impacts

The soils surrounding the anolyte tanks are visibly stained (Reference SR, September 19, 1991).

A review of the geohydrological report prepared by KMCC in 1985 reveals that shallow groundwater in the the Leach Plant area exhibited elevated conductivity values. A high conductivity plume present in the shallow groundwater extends to the north-northwest from beneath Unit 6 and passes beneath a portion of this area (Reference K167). Therefore, the elevated conductivity values have not been specifically linked to spills or releases in the Leach Plant area.

6.10 Leach Plant Area Sulfuric Acid Storage Tank

6.10.1 Description of Spill/Release

Background

Concentrated sulfuric acid (98 percent by weight) is stored in a vertical, closed top above ground tank installed on a cement containment pad. This tank is believed to have been installed by WECCO between 1950 and 1953 during construction of the original Leach Plant. The sulfuric acid from this tank is fed to the leach tanks to reconstitute the leach solution. The sulfuric acid storage tank is located at grid coordinates C6-20 on Map 6-1 (Reference K253; SR, September 10, 1991).

Spills/Releases

The sulfuric acid storage tank has been associated with both reportable quantity and non-reportable quantity spills. Sulfuric acid is a corrosive hazardous substance with an RQ of 1,000 pounds (Reference K070A, K173). Sulfuric acid releases were onto the concrete containment area with overflow to the surrounding soil. The concrete containment area shows signs of deterioration from the acid spills (Reference SR, September 10, 1991).

A review of KMCC files revealed one documented reportable quantity spill of concentrated sulfuric acid. On July 31, 1984, 200-300 gallons of sulfuric acid was spilled onto the ground south of the Leach Plant (Reference K104A).

6.10.2 Analysis of Response Measures

Upon discovery of the spill on July 31, 1984, KMCC personnel neutralized the acid with lime or soda ash. The National Response Center and the NDEP were both contacted later on the same day to report the spill and actions taken. The NDEP advised KMCC to evaluate the soil pH for nonhazardous indications prior to removing and discarding the impacted soil in the on-site nonhazardous manganese tailings area. The reviewed documentation did not contain a reference as to whether the soil was tested for pH prior to transfer (Reference K104A).

KMCC has replaced the original tank with a new sulfuric acid storage tank that includes secondary containment. The old tank has been shut down and taken out of service. KMCC plans on testing the soil beneath the concrete pad when the old tank is removed (Reference K357; SR, February 20, 1992).

6.10.3 Contaminant Migration Pathways

The contaminant migration pathways are to adjacent soils, the concrete containment pad, and possibly groundwater.

6.10.4 Evidence of Existing Environmental Impacts

The concrete pad beneath the original acid storage tank and the soil in the surrounding area are visibly stained, presumably reflecting residual impacts from historic spills. The concrete pad beneath the former sulfuric acid storage tank shows signs of deterioration.

6.11 Leach Plant Area Leach Tanks

6.11.1 Description of Spill/Release

Background

The leach tanks are an integral part of the manganese ore beneficiation process. Manganese is leached from calcined ore in the presence of fresh sulfuric acid and anolyte solution. The leach tanks accept fresh calcine, sulfuric acid from the sulfuric acid storage tank, and anolyte solution from the anolyte tank. The mixture is then agitated to promote the leaching process (Reference K253; SR, September 10, 1991).

The Leach Plant area contains two sets of leach tanks. Each set consists of open top tanks installed within a concrete containment area. The first set consists of four 2,000- to 3,000-gallon capacity, 5-foot high, tanks which were installed with the original Leach Plant (Reference Map 6-1, grid coordinate C6-20). These tanks were taken out of service on August 1, 1991. The spills addressed in this report are associated with this first set of tanks (Reference SR, September 10, 1991).

The second set of leach tanks was placed on-line, in full operating capacity on August 1, 1991 (Reference K357). This second, new set of tanks is rated at 250,000 gallon capacity and is located within secondary containment. Indications of spills or releases associated with this second, new set of leaching tanks were not observed (Reference SR, September 10, 1991).

Spills/Releases

The first set of leaching tanks (the formerly used tanks) experienced spills as a result of overflow of liquid.

The concrete containment area (concrete pad and curbing) associated with these leach tanks was deteriorated and observed to be in poor condition on September 10, 1991. On the day of the SR, the concrete containment area around the old set of tanks was obviously unable to function as originally designed for retaining liquids. The concrete containment area and the surrounding soil within a 3- to 5-foot radius of each of the four tanks were observed to be visibly impacted from historic spills (Reference SR, September 10, 1991).

6.11.2 Analysis of Response Measures

The spilled leach solution was left on the concrete pad and/or on the ground after the releases occurred. The released solution was considered to be nonhazardous due to the leaching process operating between a pH of 3 to 7. Control of pH between this range assured maximum acid utilization while still producing a concentrated manganese solution suitable as electrolysis feed (Reference K357).

The long term KMCC response was to discontinue use of the first, old set of tanks and replace them with a second, new set of tanks. KMCC installed the second set of leach tanks with improved secondary containment and overflow protection. Overflow protection measures include a higher freeboard on the sides of tanks, overflow lines, and liquid level controls. The new leach tanks were installed on a concrete pad which incorporated secondary containment (Reference SR, September 10, 1991).

The installation of a new set of tanks and associated protection measures appears adequate for mitigating future releases.

6.11.3 Contaminant Migration Pathways

The contaminant migration pathways include the concrete containment pad, the soil beneath and in the immediate vicinity of the pad, and possibly groundwater.

6.11.4 Evidence of Existing Environmental Impacts

The concrete containment pad and the surrounding soil within a three to five foot radius of each of four tanks are visibly stained from historic spills of leach solution (Reference SR, September 10, 1991).

A review of the 1985 hydrogeological report prepared by KMCC reveals that shallow groundwater beneath the Leach Plant area exhibited elevated conductivity values (Reference K167; Section 6.9.4 of this report).

6.12 Leach Plant Area Transfer Lines To/From Unit 6

6.12.1 Description of Spill/Release

Background

The Leach Plant produces a concentrated manganese sulfate solution that is pumped to the Unit 6 electrolytic cells (Reference Section 6.9.1 of this report). In the electrolytic cells, manganese dioxide is plated out and the electrolyte (anolyte solution composed of sulfuric acid and manganese sulfate) is returned to the leach plant for reconstitution. Currently, there are two above ground solution transfer pipelines between Unit 6 and the Leach Plant area sharing a common pipe rack, pipe trench, and pipe supports. These lines carry the spent anolyte solution and the concentrated manganese sulfate solution between Unit 6 and the leach plant. These lines are located at the following grid coordinates: D-21 to C9-21 to C9-19 to C7-19 as shown on Map 6-1. The original Leach Plant had underground transfer lines which experienced numerous small leaks. The underground transfer lines were replaced with above ground lines in 1986 (Reference K146A, K146C; SR, September 10, 1991).

Historically, the transfer pipelines have been constructed of one of three materials: high density polybutylene (HDPB), high density polyethylene (HDPE), and most recently, Teflon-lined carbon steel. Leaks generally have been associated with the solution lines constructed of HDPB and HDPE (Reference K146C, K344, K357).

Spills/Releases

Reportable and non-reportable quantity releases of manganese solutions have occurred from the pipelines throughout the life of Leach Plant operations. Leaks resulted from corrosion, fatigue, and stress failure of the pipe (Reference K146C, K357).

The following are examples of the documented releases on file:

- February 25, 1986; approximately 5,500 gallons of anolyte solution containing 139 gallons (2130 pounds) of sulfuric acid were released to the ground surface. The release occurred when an anolyte transfer line separated. The RQ for sulfuric acid is 1,000 pounds (Reference K140A, K170).

- o A buried anolyte transfer line has been the source of numerous small leaks (Reference K146A).

6.12.2 Analysis of Response Measures

KMCC release response actions included implementing one or more of the following measures depending upon the size of the release (Reference K140A):

- o stopping liquid flow in the leaking line by activating proper process controls;
- o using manganese tailings from the on-site, nonhazardous manganese tailings area to contain, neutralize, and absorb the released liquid;
- o neutralizing the solution with either lime or soda ash;
- o testing the remediated material for nonhazardous pH conditions and subsequently disposing the material in the on-site, nonhazardous manganese tailings area; and
- o notifying appropriate agencies of the release and mitigative measures taken.

The above listed response actions appear to be appropriate for the initial mitigation.

More recently, KMCC began to replace the HDPB and HDPE piping with Teflon lined carbon steel piping. KMCC has also instituted a program of regular visual inspections by operating personnel to monitor the above ground transfer lines for leaks (Reference K146A, K357).

6.12.3 Contaminant Migration Pathways

The contaminant migration pathways, due to leaks in the solution transfer lines, include soil and possibly groundwater.

6.12.4 Evidence of Existing Environmental Impacts

The soil is visibly stained along portions of the transfer lines (Reference SR, September 10, 1991).

A review of the 1985 hydrogeological report prepared by KMCC reveals that shallow groundwater beneath the Leach Plant area exhibited elevated conductivity values (Reference K167; Section 6.9.4 of this report).

6.13 AP Plant Area Screening Building, Dryer Building, and Associated Sump

6.13.1 Description of Spill/Release

Background

The D-2 building (the product screening building) and its neighboring building (the dryer building) share a common sump and floor drain system. The sump servicing both the dryer building and the screening building is located adjacent to the north side of the dryer building. The grid coordinate for the location of the sump, dryer building and screening building is B8-10 on Map 6-1. The dryer building, screening building, and the sump were constructed as part of the original ammonium perchlorate (AP) plant during the early 1950's (Reference K164; SR, September 10, 1991).

The sump is situated in a topographically low area and is constructed of fiberglass reinforced plastic (FRP). This sump collects washdown water as part of the process. This sump is equipped with automatic level control and pumping devices.

Spills/Releases

Releases in this area occurred from two activities: (1) washdown operations in the dryer building and screening building, and (2) sump overflows. The liquid released is water containing dissolved AP (Reference K357).

The slope of the concrete floors in each building is such that when operators wash down the area with water, some water does not flow into the floor drain as a result of poor drainage patterns. Some of the water flows out of the building away from the buildings' floor drains. This occurs in both the dryer building and the screening building. The concrete floors and the asphalt outside of each building have white stains caused by the deposition of AP after the water has evaporated. (Reference SR, September 10, 1991).

Additionally, the sump has overflowed on occasion as a result of excessive washdown water (Reference K357).

6.13.2 Analysis of Response Measures

A review of KMCC files did not reveal documentation on releases in this area or associated response measures. Kleinfelder understands that KMCC did not have formal response measures to handle the release of washwater containing AP caused by building washdown or sump overflow (Reference K357).

KMCC is in the process of correcting the drainage pattern deficiencies existing in the dryer and screening building areas so that all washwater will drain to the floor drains leading to the sump (Reference K357).

KMCC plans to address the sump overflow events by improving management control practices (Reference K357).

6.13.3 Contaminant Migration Pathways

The contaminant migration pathways are the asphalt surface, soil, and groundwater.

6.13.4 Evidence of Existing Environmental Impacts

The asphalt surface leading away from both the dryer building and the screening building was observed to be stained with a white, powder material during the SR. Visible evidence of releases from the sump were not observed (Reference SR, September 10, 1991).

6.14 AP Plant Area Tank Farm

6.14.1 Description of Spill/Release

Background

The tank farm area contains a number of vertical, open and closed top tanks used for storing various chemicals, as listed below, in support of the production of high purity AP. The storage tanks are located in the AP Plant tank farm area at grid coordinates B9-14 to B9-15 on Map 6-1 and include the following (Reference SR, September 10, 1991; K357):

- o two AP storage tanks on concrete pads built as part of the original AP Plant during the early 1950s;

- o two new AP storage tanks constructed during 1991 on a concrete pad with secondary containment;
- o a sodium perchlorate storage tank, a sodium hydroxide storage tank, and a hydrogen peroxide storage tank all constructed as part of the original AP Plant tank farm during the early 1950s; and
- o a new sodium hydroxide storage tank constructed during 1991 with secondary containment.

Spills/Releases

Small and infrequent non-reportable quantity leaks and spills have been associated with the old AP storage tanks and with the old sodium hydroxide storage tanks throughout the life of the plant (Reference K357).

The AP releases resulted from small, pinhole size leaks developing in the sides of the tanks, releasing the liquid contents onto the concrete pad and adjacent soil. The concrete pad was observed to be in poor condition during the September 10, 1991, SR (i.e. pitted and crumbled). The deteriorating pad does not adequately route liquids to the central sump (Reference SR, September 10, 1991; K357).

The central sump is situated in a topographically low area and is constructed of a sloped asphalt surface leading to a fiberglass reinforced plastic (FRP) tank. This tank collects process liquids and solid material for recycling to the process. This tank is managed as a means to facilitate material recycling.

Additionally, small, non-reportable quantity releases of sodium hydroxide have occurred during the dilution of 25 percent to 10 percent sodium hydroxide solution. The sodium hydroxide solution overflowed from the tank onto the concrete pad and onto the soil in the immediate area (Reference K357).

6.14.2 Analysis of Response Measures

Releases of AP onto the concrete pad were washed down and the washwater recycled to the process. Releases of small amounts of AP to the soil were not addressed (Reference K357).

KMCC handled releases of sodium hydroxide in one of two ways: (1) adding citric acid, or (2) no neutralization (Reference K357).

The long-term KMCC response for addressing sodium hydroxide releases was to construct a new sodium hydroxide storage tank on a concrete pad with secondary containment (Reference SR, September 10, 1991).

The long-term KMCC response for addressing AP releases was to improve the drainage system to the central sump by adding a new asphalt surface in a section of the tank farm area that was deteriorating. KMCC also constructed two new AP storage tanks (250,000 and 500,000 gallons, respectively) on concrete pads with secondary containment and sealed joints (Reference SR, September 10, 1991).

6.14.3 Contaminant Migration Pathways

The contaminant migration pathway associated with historic releases of AP and sodium hydroxide in the AP tank farm area is the soil.

6.14.4 Evidence of Existing Environmental Impacts

The soil in the tank farm area is visibly stained from historic, small, non-reportable quantity releases of AP and sodium hydroxide (Reference SR, September 10, 1991).

6.15 AP Plant Area Change House/Laboratory Septic Tank

6.15.1 Description of Spill/Release

Background

The AP Plant area change house building was constructed as part of the original AP Plant in the early 1950s and is located at grid coordinate B9-4 on Map 6-1. The change house building also contains a chemistry laboratory which was built in 1980. The change house/laboratory building has showers for operating personnel's daily use and a chemistry laboratory to support plant operations. Wastewater effluent from the showers, rest rooms, and laboratory sinks discharge to a septic tank and leach field located adjacent to the northwest portion of the building at grid coordinate B8-4 on Map 6-1 (Reference K357).

The laboratory operations include the rinsing of laboratory utensils, instruments, and equipment associated with the preparation of standards, caustic and acid solutions for pH determinations, and dilute titrants including dilute formaldehyde titrant. The rinse water discharges to the septic tank (Reference SR, September 10, 1991; K357).

Spent chemicals are not discharged to the septic system. They are temporarily stored on-site in SWMU 028, and subsequently shipped off-site in lab packs for disposal as described in Section 5.28.

Spills/Releases

Releases in this area are associated with routine sewerage from connected units to the septic tank and the surrounding leach field. Since the laboratory was constructed in 1980, the wastewater most likely contains dilute concentrations of contaminants from the laboratory's rinse water activities.

6.15.2 Analysis of Response Measures

KMCC plans to install the necessary equipment and pipelines to pump the laboratory effluent to the existing on-site sanitary sewer network that is routed to the City of Henderson POTW (Reference K357).

6.15.3 Contaminant Migration Pathways

The contaminant migration pathways associated with the septic tank and leach field include soil and possibly the groundwater.

6.15.4 Evidence of Existing Environmental Impacts

Kleinfelder did not find documentary evidence of existing environmental impacts related to the septic tank and associated leach field.

6.16 AP Plant Area Storage Pads - Fire

6.16.1 Description of Spill/Release

Background

The AP Plant storage pad consists of a flat concrete pad in an open area located a substantial distance from the nearest building or structure. The concrete pad area is used for the storage of Ammonium Perchlorate (AP) product. The storage pad area is located at grid coordinates B2-15 to B2-16 on Map 6-1. This area has been used as a storage area since the construction of the original plant in the early 1950s (Reference K164; SR, September 10, 1991).

Spill/Release

A review of the KMCC files revealed that there has been one reportable quantity release associated with the AP storage pad area. The reviewed documents revealed the following information (Reference K158B):

- July 18, 1990, a fire occurred in the AP storage pad area in which a 55-gallon drum containing AP initiated decomposition throughout the Pad 18 area. Approximately 100 tons of AP was stored in four hundred 55-gallon drums in the area. The decomposition of AP created a fire releasing hydrogen chloride fumes. Hydrogen chloride is listed as a Extremely Hazardous Substance (SARA Section 302(a)) and as a Hazardous Substance (40 CFR 117.3) with a reportable quantity release threshold of 5,000 pounds. An estimated 100 tons of AP produced 50,000 pounds of hydrogen chloride fumes released in the 45 minute duration of the fire.

6.16.2 Analysis of Response Measures

KMCC responded to control the fire and control the release of hydrogen chloride fumes.

The soil around the fire area became contaminated with ammonium perchlorate (AP) and decomposition products which were washed by the fire response water. The firewater drained off the pad onto the soil in the surrounding area. The contaminated soil was subsequently removed, placed into drums, and hauled off-site for disposal as nonhazardous waste at a hazardous waste landfill (Reference K158B, K357).

6.16.3 Contaminant Migration Pathways

The contaminant migration pathway, as a result of "depositional" releases associated with this fire, is the soil.

6.16.4 Evidence of Existing Environmental Impacts

Kleinfelder did not find documentary or visual evidence of existing environmental impacts as a result of the fire at the AP Plant storage pad. Impacted soil was removed and disposed (Reference K357).

6.17 AP Plant Area Old Building D-1 - Wash Down

6.17.1 Description of Spill/Release

Background

The old D-1 building is located at grid coordinate B2-11 on Map 6-1. The building is used for dry material handling, mixing, and blending of ammonium perchlorate (AP). The old D-1 building was built as part of the original AP plant construction during the early 1950s (Reference K164, K357; SR, September 10, 1991).

Spills/Releases

During the material handling, mixing, and blending activities, small amounts of AP fall onto the floor of the old D-1 building. KMCC personnel routinely sweep the building floors to collect this product. On an infrequent basis, about once every other month, the old D-1 building is washed down after sweeping. The washdown water contains dissolved AP and drains out onto the asphalt pad surrounding the old D-1 building. Some of the washwater drains onto the soil adjacent to the asphalt (Reference K357; SR, September 10, 1991).

6.17.2 Analysis of Response Measures

Kleinfelder understands that KMCC does not have formal response measures to control run-off of washdown water from the old D-1 building onto the asphalt and adjacent soil. However, mitigative measures employed by KMCC include sweeping the floors prior to washdown to greatly reduce the amount of AP that may be present in the washwater (Reference K357).

Additionally, the activities occurring in old D-1 building are anticipated to be relocated to the new KMCC Apex, Nevada facility (Reference K357).

6.17.3 Contaminant Migration Pathways

The contaminant migration pathways associated with the old D-1 building washdown activities include possible run-off from the building pad to the adjacent soils.

6.17.4 Evidence of Existing Environmental Impacts

Kleinfelder did not observe visual evidence of environmental impacts associated with the old D-1 building washdown activities. Stains were not visible on the building floor or adjacent asphalt, during the September 10, 1991 SR. The minor amount of white staining observed on adjacent soil appeared to result from spillage during material transfer (Reference SR, September 10, 1991 and August 20, 1991).

6.18 AP Plant Area New Building D-1 - Wash Down

6.18.1 Description of Spill/Release

Background

The new D-1 building is located at grid coordinate B3-11 on Map 6-1. Operations started in the new D-1 building in January 1989 and continued for approximately six months until July 1989. The new D-1 building was used for dry material handling, mixing, and blending of ammonium perchlorate (AP). The new D-1 building is equipped with a dust collection unit to capture emissions of AP from material handling activities (Reference K357; SR, September 10, 1991).

Spills/Releases

During the material handling, mixing, and blending activities, small amounts of AP not collected by the dust collector would fall to the floor. The new D-1 building was washed down on an infrequent basis after the floor had been swept. The washdown water, containing small amounts of dissolved AP, drained onto the asphalt pad outside the new D-1 building (Reference K357; SR, September 10, 1991).

6.18.2 Analysis of Response Measures

KMCC used the new building for only a short time and has discontinued use of the new D-1 building.

6.18.3 Contaminant Migration Pathways

The contaminant migration pathways associated with the new D-1 building washdown activities include the asphalt outside the building and the adjacent soil.

6.18.4 Evidence of Existing Environmental Impacts

Kleinfelder did not observe visible evidence of environmental impacts associated with the new D-1 building washdown activities (Reference SR, September 10, 1991).

6.19 AP Plant SIs and Transfer Lines To/From AP SIs

6.19.1 Description of Spill/Release

Background

The AP Plant transfer lines extend from the AP cooling towers to the five AP process surface impoundments (SIs), between these five SIs, and back to the AP process. This area is located by the following grid coordinates: B6-11 to B7-14, B4-13 to B7-15, B7-15 to B7-18, and B7-15 to B8-16 on Map 6-1 (Reference SR, September 10, 1991).

There are three types of releases associated with this area of operation: (1) cooling line breaks to and from the AP cooling towers, (2) leaks from the AP solution transfer lines, and (3) leaks from AP SIs. The cooling towers are located at grid coordinate B8-13 on Map 6-1 (Reference K357; SR, September 10, 1991).

There are five process SIs in this area; AP-1 through AP-5. These impoundments are used to concentrate dilute AP containing solutions by routing the liquor to sequentially more concentrated impoundments (Reference K158A).

SIs AP-1, AP-2, and AP-3 were initially placed into operation on May 8, 1974 (Reference UE030). The transfer lines, impoundment liners, and other equipment have been serviced, repaired or replaced on an as-needed basis over time (Reference K037, K065, K210, K212, K214).

Spills/Releases - Pipelines

On rare occasions the AP solution lines to and from the cooling towers have broken and released AP solution to the ground in the surrounding area. Other pipeline breaks between the process area and the SIs have resulted in releases to the ground (Reference K357).

Three types of transfer line materials are used in the AP area: (1) the permanent, rigid lines constructed of FRP, (2) the flexible, temporary lines constructed of HDPE, and (3) the permanent lines constructed of Transite^{R}/concrete (Reference K357).

Poor connections in the HDPE flexible lines and at the pumping station couplings have also contributed to small releases of AP solution (Reference K357).

Spills/Releases - Surface Impoundments

Documentation of leakage from process impoundments AP-1, AP-2, and AP-3 was found (Reference K037, K065, K210, K214). Impoundment AP-2 leaked in 1979. The single liner was subsequently replaced with another single liner for both SI AP-2 and AP-3 prior to June 19, 1980 (Reference K037, K065, UE024). Impoundments AP-1 and AP-3 required frequent patching by late 1983 to mitigate leaks that had developed. These two SIs (AP-1 and AP-3) were removed from service and the liners replaced with new double liner systems. KMCC monitors these SIs for leaks on a routine basis and reports results in their NPDES permit DMR's (Reference K158A, K210).

6.19.2 Analysis of Response Measures

An August 17, 1982 KMCC letter to the NDEP listed the following response measures employed to evaluate a surface impoundment for suspected leakage (Reference K065):

- a review of operational activities is conducted to learn whether an activity or event could have occurred leading to a potential puncture in the SI's lining;
- the SI is isolated from service, or if kept in service, the liquid volumes added to the SI are recorded;

- o the SI level is more carefully tracked for comparison with the estimated level change expected due to evaporation;
- o the SI is sampled on an accelerated schedule to determine if an inventory change, indicative of a leak, takes place; and
- o the findings are evaluated. If these procedures reveal that a leak exists, the SI is drained and the liner is either repaired or replaced.

These response measures were employed in 1979 and confirmed that impoundment AP-2 was leaking. Initially the liner was repaired and subsequently replaced prior to June 19, 1980 (Reference K065, UE024).

In addition, as an overall response measure and as required by its NPDES permit, KMCC maintains a groundwater monitoring program associated with single lined surface impoundments such as AP-2 (Reference K158A, K305, K320).

6.19.3 Contaminant Migration Pathways

The contaminant migration pathways associated with releases of AP solution lines to and from the AP cooling towers, pump stations, and surface impoundments are to soil and groundwater.

6.19.4 Evidence of Existing Environmental Impacts

Soils are visibly stained along portions of the transfer lines, in the immediate area of the cooling tower, and in the immediate area of the transfer line pump stations (Reference SR, September 10, 1991).

A review of groundwater monitoring summary information provided in NPDES permit discharge monitoring reports in 1985 and 1986 reveals elevated concentrations of AP, sodium chloride, and conductivity at the AP impoundment area downgradient monitoring wells M-15, M-25 (Reference K320). These AP impoundment area downgradient monitoring wells could not confirm a definite source of the impact as being any particular impoundment. Concentrations of AP in downgradient groundwater monitoring wells were relatively constant and somewhat elevated compared to upgradient monitoring wells during the 1987-1989 period (Reference K320).

These findings are somewhat consistent with those in the 1985 hydrogeologic report prepared by KMCC showing shallow groundwater conductivity impacts throughout this portion of the AP process area (Reference K167). The NPDES system monitoring graphs also show a general trend of increasing conductivity values (in each of the three monitoring wells) from 1985 through 1990 (Reference K305, K320).

6.20 AP Plant Transfer Lines to Sodium Chlorate Process

6.20.1 Description of Spill/Release

Background

AP Plant transfer lines extend from the AP Plant tank farm area to the main chlorate process area in Unit 3. These lines traverse a long distance through the KMCC facility along the grid coordinates: B9-14 to Cl-14; C1-14 to C1-17; Cl-17 to C9-17; C9-17 to D2-18; D2-18 to D2-12 on Map 6-1. These lines consist of flexible HDPE pipe (Reference K357; SR, September 10, 1991).

Prior to January 1976, AP Plant facility waste streams were discharged directly to the Beta Ditch (Reference K037, K056). These discharges typically consisted of solutions of sodium chloride and sodium hypochlorite formed from a chlorine gas scrubbing operation occurring in the tank farm area.

In January 1976, the KMCC facility achieved a "zero discharge" status for industrial wastewater and the routing of these AP plant tank farm waste streams into the Beta Ditch was discontinued (Reference K037, K056). These solutions were rerouted for use in the facility sodium chlorate process (Reference K357).

Spills/Releases

The releases associated with the AP Plant sodium chlorate process are therefore separable into two time periods: (1) releases prior to 1976 involving discharge of sodium chloride and sodium hypochlorite solution into the Beta Ditch and subsequently to the BMI ponds, and (2) post 1976 releases comprised of leaks in the flexible HDPE lines resulting from structural failure and fatigue causing pinhole-size leaks in the pipelines. Several small, non-reportable quantity solution spills have occurred as a result of such pipeline leaks (Reference K357).

6.20.2 Analysis of Response Measures

KMCC conducts periodic visual checks of the transfer lines to detect leaks of neutralized sodium hypochlorite. When a leak is detected, KMCC promptly responds by stopping flow in the transfer line and repairing the leak. The small amount of released solution is typically left on the ground at the spill point (Reference K357).

6.20.3 Contaminant Migration Pathways

Prior to 1976, the contaminant migration pathway was the Beta Ditch to the upper BMI ponds, soil, and groundwater.

Since 1976, the release is to soil in the immediate area of the transfer line leaks.

6.20.4 Evidence of Existing Environmental Impacts

Pre-1976 environmental impacts potentially associated with AP tank farm discharges of sodium chloride and neutralized sodium hypochlorite are infiltration of dissolved inorganic constituents along the Beta Ditch and upper BMI ponds (Reference UB001, UB008, UB015).

Kleinfelder did not observe visual evidence of environmental impacts associated with the releases from the transfer pipelines (Reference SR, September 10, 1991).

7.0 MISCELLANEOUS ACTIVITIES

General

The following subsections provide information regarding several past or present miscellaneous activities conducted by KMCC or its tenants. These activities include KMCC disposal in common areas; use of the storm sewer and acid drain systems; the on-going chromium remediation program; decommissioning of the old sodium chlorate plant; and descriptions of tenants operations.

This section has sixteen (16) subsections. The information used to develop these subsections was obtained from a review of documents, interviews, and site reconnaissance. Few documents were found describing tenant activities. Therefore, the majority of the tenant activity descriptions are based on information developed from site reconnaissance, interviews, and environmental compliance audits. Each subsection provides the following information:

- o history and description of the activity;
- o results and analysis of the activity; and
- o potential or known releases or environmental impacts related to the activity.

7.1 BMI Common Area Disposal (Upper and Lower BMI Ponds)

7.1.1 History and Description of Activity

The BMI ponds are located north-northeast of the BMI complex. These waste management ponds cover a large area between Boulder Highway, Lake Mead Drive, and the Las Vegas Wash and were unlined. The terms "upper" and "lower" BMI ponds refers to the physical location of a system of ponds relative to the Las Vegas Wash and the BMI complex. The lower BMI ponds abut the Las Vegas Wash whereas the upper BMI ponds are positioned closer to the BMI complex (Reference Plate 3-1).

Construction of the upper and lower BMI ponds appears to have been completed by April 18, 1943 (Reference UB003, K164). These unlined ponds were designed for managing industrial wastewater originating from the BMI complex (Reference UL020).

The need for the BMI ponds was realized after the existing disposal system (the four "Trade Effluent" evaporation/setting ponds located on the BMI complex) was deemed inadequate. An error was made in the evaporation calculation during design of the four "Trade Effluent" evaporation/settling ponds. Therefore, the upper and lower BMI ponds were designed and built to replace the existing disposal system (Reference UL020).

The main route of discharge to the BMI ponds was via a system of open surface ditches and subsurface siphons. Process aqueous wastes were first discharged to the "Beta Ditch", an unlined east-west drainage ditch (Reference Section 5.20 of this report). Aqueous wastes entering the Beta Ditch flowed by gravity to the east to a siphon near the Boulder Highway. The siphon transmitted the wastewater under Boulder Highway to another unlined open surface ditch (The "Acid Ditch") which paralleled the southern margin of the upper BMI ponds. Aqueous wastes were then routed to ponds within the upper or lower BMI pond system via a distribution ditch within the pond system. KMCC believes the majority of KMCC wastes were routed to the upper BMI ponds (Reference K056, K164, UE060).

The main route of discharge to the BMI ponds (as described above) was also used by the various neighboring operating companies and tenants within the BMI complex. Aqueous waste streams from these various companies entered the Beta Ditch where they were commingled enroute to the BMI ponds (Reference K056).

The BMI ponds received slurried waste from the BMI complex beginning in approximately 1942 or 1943 until the mid 1970s when each of the operating companies was required to effect a "zero discharge" industrial wastewater management status. In addition to waste streams generated by U.S. Government operations and the City of Henderson Sewage Treatment Plants (STP) #1 and #2, discharges to the BMI ponds included in excess of 5 million tons of liquid wastes from sources including: WECCO operations of 1945 to 1955; AP & CC operations of 1956 to 1967; KMCC operations of 1967 to 1975, and several neighboring companies (including Stauffer, Montrose, U.S. Lime, and Timet) and Tenants (including State Industries) between approximately 1945 and 1976. In January 1976, KMCC's industrial wastewater discharges to the BMI ponds were ceased in accordance with NPDES Permit NV 0000078 (Reference C001, K032, K037, K039, K056, K179, K347, UE060, UE088, UE104, UL001).

Detailed information on U.S. Government waste generation and disposal was not found by Kleinfelder during this study. However, reviewed documents indicate the effluents included both acid and caustic liquors. The acid effluent was comprised of hydrochloric acid generated from wash towers in the chlorination portion of the magnesium "metal units". The caustic waste was comprised of caustic liquor which was used in associated acid absorber towers (Reference UL020).

Municipal and industrial sewage effluents have also been disposed of in the upper and lower BMI ponds since 1942. BMI operated a sewage treatment plant (STP #2) until approximately 1972/1974 when the City of Henderson assumed operation (Reference UE061, UE143). Effluent from STP #2 had been discharged to the upper BMI ponds (Reference UE143). The City of Henderson has operated another sewage treatment plant (STP #1) since 1958 and discharged treated effluent to the lower BMI ponds (Reference UE059, UE143).

State Industries periodically discharged liquid wastes to the Beta Ditch through the acid drain system between June 1970 and December 1974. From June 1970 to September 1972, approximately 35,000 gallons of pickling process wastes were discharged each month. Monthly discharges consisted of approximately 2,500 gallons of spent sulfuric acid, 300 pounds of borax, 500 pounds of soda ash and 4,000 pounds of phosphate chemicals. Between June 1970 and October 1971 State Industries also periodically discharged neutralized and unneutralized waste cyanide solutions to the Beta Ditch through the acid drain system. These discharges contained approximately 176 pounds of cyanide. Additionally, between June 7 and December 10, 1974, State Industries discharged surface impoundment contents to the acid drain system on three occasions to facilitate liner repairs (Reference K298, K300, K301, K302, UE103, UE114; Section 7.6 of this report).

Records indicate WECCO, AP & CC, and KMCC discharged various wastes to the BMI ponds between 1945 and January 1976 (Reference UE088). Detailed information regarding the quantity of waste and location of waste disposal is not known by KMCC because BMI managed the pond usage (Reference K056). However, based on a 1970 NPDES report, it was extrapolated that the combined effluent discharged by WECCO, AP & CC and KMCC to the BMI ponds prior to January 1976 is believed to be approximately 600,000 gallons per day (Reference K037). The average content of this effluent was reported to the EPA by KMCC and is shown in Table 7.1.1.

Table 7.1.1

Average Discharge to the Beta Ditch (Pre-January 1976)
(Reference K037)

Parameters	Mass Flow (Pounds per day)
Total Dissolved Solids (TDS)	19,100
Suspended Solids	1,080
Total Solids	20,200
C.O.D. (Chemical Oxygen Demand)	110
NH_3 (Ammonia)	35
Calcium	2,000
Iron	1,100
Potassium	1,200
Sodium	5,000
Magnesium	150
Zinc	130
Manganese	1,800
Nickel	8
Lead	4
Copper	4
Cobalt	1.5
Chromium	0.3
Phosphorous	0.4

Discharges to the BMI ponds did not contain manganese dioxide process wastes. The aqueous waste streams discharged to the BMI ponds were generated from the manufacturing of chlorates, perchlorates, and boron products (Reference K037, K039, K056, K179).

The aqueous waste streams generated from the manufacture of chlorate and perchlorate products contained (Reference K056):

- o soluble salts including sodium chlorate, sodium chloride, potassium chloride, and ammonium perchlorate;
- o less soluble salts including calcium carbonate and calcium sulfate; and
- o insoluble materials including carbon and diatomaceous earth filter aid.

The waste originating from the sodium chlorate process also contained upwards of 0.05% by weight hexavalent chromium. KMCC records indicate that 391,000 cubic feet of solid chlorate wastes were sluiced to the BMI ponds prior to 1975 (Reference K037, K179, UE083).

Perchlorate wastes from the various perchlorate processes were also sluiced to the BMI ponds at various times. An unknown quantity of ammonium perchlorate process waste was sluiced to the BMI ponds between 1951 and 1974. Approximately 293,800 tons of potassium perchlorate waste was also sluiced to the BMI ponds between 1945 and 1976 (Reference K170, UE024, UE083).

The aqueous waste stream generated from the manufacture of boron products between 1972 and 1976 contained magnesium, sodium, sulfate, and boron ions and a wet scrubber stream. KMCC estimates approximately one million gallons of aqueous waste generated from this process between 1972 and 1976 was discharged to the BMI ponds (Reference K039, K179, UE083).

7.1.2 Results and Analysis of Activity

The use of the upper and lower BMI ponds for routine waste disposal purposes occurred between approximately 1942 and December 1976 (Reference K056, K347, UE073, UE107). The wastes discharged by the U. S. Government between approximately 1942 and 1945 included acid effluent and caustic effluent (Reference UL020). Wastes generated by KMCC (and their predecessors, WECCO and AP & CC) and the other operating companies and tenants between approximately 1945 and prior to January 1976 were commingled within the Beta Ditch prior to discharge to the BMI ponds (Reference K056, K347). Because BMI managed the pond system between May 1952 and December 1976, KMCC did not generate records regarding which ponds were used for it's waste disposal (Reference K056, UE073).

The historic waste management activities resulted in the disposal of various company waste streams as commingled wastes in numerous different individual unlined ponds within the upper and lower BMI pond system. The exact individual ponds used for disposal, the time period of disposal, and the quantity and quality of waste constituents disposed are not known by KMCC or BMI (Reference K056, UE073, UE085, UE107).

Information regarding the types of waste disposed to the BMI ponds will be addressed separately by each company involved in ECAs.

The sodium chlorate filter cake generated by KMCC and its predecessors (containing approximately 0.05% by weight hexavalent chromium) was sluiced to the BMI ponds from 1945 to 1975. During this time, an estimated 391,000 cubic feet of sodium chlorate filter cake waste, containing hexavalent chromium, was disposed in the BMI ponds (Reference K179).

The presence of hexavalent chromium within the upper BMI ponds also can be attributed to two types of discharges from the old main cooling tower; (1) cooling water containing chromium added as a corrosion inhibitor, and (2) process solution spills. Approximately 1,000 to 1,300 pounds of sodium dichromate was routed to the upper BMI ponds in May 1980 when the main cooling tower was purged due to safety concerns as a result of a spill of chlorate process solution into the cooling water. The purge water contained sodium chlorate process solutions as a result of a gasket failure (Reference K038).

Another source of discharges to the lower BMI ponds is the "Pittman Underdrain". A four-inch diameter pipe which connected to the underdrain and discharged to the lower BMI ponds was sampled by Ecology and Environment, Inc. (E & E) and analyzed in February 1982. The analyses revealed detectable concentrations of several inorganic and organic constituents. The presence of these constituents may be attributed to the underdrain draining contaminated groundwater (Reference UE097, UE098, UE099).

7.1.3 Potential or Known Releases or Environmental Impacts Related to Activity

Several separate soil sampling events of the BMI ponds were initiated by the U.S. EPA. The first sampling event was conducted in 1980 by J.R.B. Associates. Another sampling event was conducted in 1985 by Ecology and Environment, Inc. (E & E). Both sampling events yielded similar information and revealed the presence of elevated concentrations of total chromium and lead in surface soil samples collected from the upper and lower BMI ponds. Hexavalent chromium was not specifically sampled for in either of these sampling events (Reference K179, UE062).

J.R.B. Associates also conducted surface water and groundwater sampling in 1980 in the vicinity of the Las Vegas Wash at locations downgradient from the BMI ponds. These data revealed concentrations of total chromium in surface water and groundwater at values between 2 and 20 times background (Reference K179).

The following findings were reported by E & E in a March 15, 1990 report based on analytical data and other background information obtained (Reference K179):

- o chromium has been detected in surface soil samples collected from both the upper and lower BMI ponds. The total extent of chromium contamination is unknown. However, because the waste was discharged as a liquid, it is possible that the waste spread over a large area of the ponds;
- o the source of total chromium detected in the groundwater and surface water samples appears to be the BMI ponds;
- o the release of chromium to the Las Vegas Wash could have occurred by migrating groundwater or migrating surface water run-off from the BMI ponds;
- o although there is no documented release of contaminants from the BMI ponds to the air pathway, this potential exists. The BMI ponds are dry, uncovered, and contaminated with waste constituents at the surface. Residential portions of Pittman and Henderson are within less than 0.5 miles of the BMI ponds; and
- o the BMI ponds pose a potential for on-site exposure. There is no continuous barrier to entry. Footpaths and off-road vehicle trails extend onto portions of the BMI pond system. The total area of contamination is unknown, however, the potential area of contamination is large due to the method of waste disposal.

7.2 BMI Common Area Disposal (BMI Landfill)

7.2.1 History and Description of Activity

The BMI landfill is located near the central portion of the BMI complex (Reference Plate 3-1; UE024). The BMI landfill is situated upon an area formerly used as a "Trade Effluent" evaporation/settling pond during U. S. Government era operations. Solid wastes may have been placed in this area prior to 1950, however, BMI began operation of this disposal area in May 1952 (Reference K164, UE073, UE086, UE107). Prior to July 1970 solid waste was disposed in open pits within the BMI

landfill and periodically burned (Reference UE086). Between July 1970 and November 1979, solid wastes were disposed in trenches and pits within this landfill and subsequently covered (Reference UE086).

The BMI landfill was closed on February 29, 1980 (Reference UE073, UE086). During the operating life of this landfill, industrial wastes were received from the various operating companies (including KMCC) and tenants (Reference K056, UE024). Both solid and liquid wastes were received by the BMI landfill (Reference UE059).

A "Notification of Hazardous Waste Site" form submitted by BMI to the U.S. EPA dated June 1, 1981 included the following listing of parties that used the BMI landfill area between 1941 and 1980 (Reference UE086):

- U.S. Defense Plant Corporation;
- Nevada Colorado River Commission;
- U.S. Bureau of Reclamation;
- Hardesty Chemical Company;
- U.S. Vanadium Company;
- Kerr-McGee Chemical Corporation and predecessors, namely, American Potash and Chemical Company and Western Electrochemical Company;
- U.S. Navy;
- Titanium Metals Corporation of America and predecessors, namely, National Lead Corporation and Pioche Manganese Company;
- Flintkote Lime Company and predecessor, U.S. Lime Company;
- Stauffer Chemical Company;
- Montrose Chemical Company; and
- Jones Chemical Company.

KMCC utilized the BMI landfill primarily to dispose of housekeeping wastes including paper, cartons, bags, pallets, drums and plastics (Reference K056). Prior to 1970, these wastes were periodically burned at the BMI landfill. From 1970 through 1980, these wastes were buried by landfill procedures (Reference K056). Kerr-McGee disposed an estimated 75 cubic yards per week of Class A combustible material and 3

cubic yards per week of non-combustible rubble in the BMI landfill (Reference K022). The Class A combustible material typically included paper, cartons, bags, pallets, drums, and plastics (Reference K022, K056). KMCC also disposed of asbestos containing material in the BMI landfill in late 1979 with CCHD approval (Reference UE080).

From 1975 to 1979, approximately 100,000 pounds of elemental carbon powder generated from the boron operations was disposed in the BMI landfill (Reference K039, UE083). These nonhazardous industrial wastes have since been managed through off-site disposal at the Clark County Sanitary Landfill (Reference K056).

Filter cake from the sodium chlorate operations were disposed in the BMI landfill from February 1975 through February 1980 after the BMI ponds were removed from service. This waste contained chiefly diatomaceous earth with amounts of chlorate salts, approximately less than 5 percent soluble chloride, and approximately 0.05% by weight hexavalent chromium. Approximately 1-1/2 to 2 tons of this waste were generated per day and approximately 90,000 cubic feet were subsequently disposed in the BMI landfill. After closure of the BMI landfill in 1980, these wastes were landfilled at the KMCC hazardous waste landfill (February 1980 to January 23, 1983) or disposed off-site at the U.S. Ecology, Inc. facility in Beatty, Nevada (1983 to present) (Reference K056, K130, K179, K268, UE083).

An estimated 50 tons of dried residues from the cleaning of surface impoundments P-1 and AP-2 were also disposed in the BMI landfill (Reference K039, UE083). This occurred when both surface impoundments were rebuilt prior to May 1980 (Reference K037). These wastes were buried in the southern portion of the BMI landfill (in an area designated as Area #2B by E & E in a Phase IIB sampling plan dated May 10, 1985) (Reference UE146).

7.2.2 Results and Analysis of Activity

Kleinfelder did not find detailed records regarding the design, operation and closure of the BMI landfill during this study. The BMI landfill received a variety of wastes from the various operating companies and tenants throughout its operating life (Reference UE086). A March 31, 1982 letter from BMI to the NDEP references an attached map (not included in the reviewed document copy) with the approximate locations of

trenches and areas used for disposal by individual companies (Reference UE107). Geraghty & Miller, Inc. later provided a copy of this map which they obtained during document review activities (Reference C002). Each trench was approximately 12 to 24 feet wide, up to 400 feet long, with a maximum depth of 20 to 24 feet (Reference GM003, UE107). The BMI landfill may have received solid wastes prior to 1950 and was closed on February 29, 1980 (Reference K164, K179, UE073, UE079, UE086). Closure included covering of solid waste areas with two to fifteen feet of waste lime, covering the lime with a minimum of two feet of soil, grading, and restricting entrance by a fence and locked gate (Reference GM004, UE086, UE107).

7.2.3 Potential or Known Releases or Environmental Impacts Related to Activity

Kleinfelder did not find records of known releases from the BMI landfill. Warning signs are posted and the area is fenced and locked to restrict public access (Reference K179, UE078, UE080, UE086, UE107). Closure of the BMI landfill occurred on February 29, 1980 (Reference UE073, UE079). Potential releases to the air and surface water pathways have been reduced due to closure.

Information regarding the types of waste disposed to the BMI landfill will be addressed separately by each company involved in ECAs.

7.3 Old Sodium Chlorate Plant Decommissioning

7.3.1 History and Description of Activities

Sodium chlorate production occurred in 1,300 electrolytic cells in Units 4 and 5 from 1945 to November 1989 (Reference Plate 3-2). The process liquids contained sodium dichromate to enhance electrolytic conversion (Reference K105).

Retention of process liquids in the basements of Units 4 and 5 and seepage from the basements and sump areas has been identified as the source of a chromium bearing plume in the groundwater (Reference K091, K105). In order to control this source of chromium in groundwater and improve process efficiencies, remedial activities were initiated and a new sodium chlorate process was designed and installed in Unit 3 (Reference K091, K105). In November 1989, sodium chlorate production ceased in Units 4 and 5. The process equipment was being dismantled during a September 18, 1991, SR.

Process equipment including electrolytic cells, tanks, piping, pumps, and related hardware were being decommissioned, cleaned, and removed during a September 18, 1991, SR. The electrolytic cells and some associated piping were being drained in place followed by the addition of cement to dry, stabilize, and solidify residual materials which remained. Cells were either removed and placed directly onto a plastic (visqueen) lined flatbed truck, covered, and shipped to a hazardous waste landfill at Beatty, Nevada or were placed in a staging area prior to loading (Reference K357; SR, September 18, 1991).

Other process equipment (tanks, piping, and pumps) were being cleaned, dismantled, and transported for off-site disposal or recycling dependent upon the degree of decontamination. Building areas are being cleaned and made available for other uses (Reference K357).

7.3.2 Results and Analysis of Activities

Decommissioning of the old sodium chlorate process eliminates the source of environmental impact due to chlorate production in Units 4 and 5. The decommissioning, dismantling, and disposal of the old process equipment is an activity which was on-going during a September 18, 1991, SR.

7.3.3 Potential or Known Releases or Environmental Impacts Related to Activity

Routine process operation and maintenance activities resulted in historic spills and releases of sodium chlorate solutions to the basements of Units 4 and 5 (Reference K091, K105).

7.4 State Industries, Inc. (KMCC Tenant)

7.4.1 History and Description of Activity

State Industries, Inc. leased portions of the KMCC property south of Units 2 and 3 for the manufacture and storage of hot water heaters. This area is located approximately 1,200 feet south of Units 2 and 3, approximately 1,000 feet north of Lake Mead Drive, and approximately 300 feet west of the Kerr-McGee main entrance road (Reference Plate 7-3). This area is fenced and the gate is locked (Reference SR, August 20, 1991). State Industries operated in this area from 1969 to approximately November or December 1988 (Reference K263, UE070, UE103).

The areas leased by State Industries included portions of Unit 1; Buildings T-4, T-5, and T-8; and a relatively large open area near the southwestern portion of the KMCC site (Reference Plate 7-3; K263, K164, UE103, UE114). Approximately one-half of the Unit 1 building was leased to State Industries to store water heaters (Reference K092).

An April 14, 1980 letter from State Industries to the City of Henderson, Director of Public Works listed the following raw material usage at this facility, see Table 7.4.1 (Reference UE071).

Table 7.4.1
State Industries, Inc.
Estimated Annual Usage of Raw Materials (1980)
(Reference UE071)

Raw Material	Estimated Annual Usages	
Raw steel	40,451,262	pounds
Insulation	8,996,588	sq. ft.
Paint	49,820	gal.
Paint thinner	132,000	gal.
Glass material	1,825,300	pounds
TURCO II H.T.C. Soap	53,350	pounds
Sulphuric acid	34,200	gal.
Soda ash	6,000	pounds
Borax	4,000	pounds
Fab. Lubricant	55,000	pounds
Gear Lubricant	2,000	pounds

From June 1970 to September 1972, State Industries is known to have used the acid drain system to convey various process wastes to the Beta Ditch (Reference K265, K302, UE103). A March 23, 1982 letter from State Industries to the NDEP indicates that during this time, monthly discharges of process waste to the acid drain system averaged approximately 35,000 gallons and included 2,500 gallons of spent sulfuric acid, 300 pounds of borax, 500 pounds of soda ash, and 4,000 pounds of phosphate chemicals (Reference UE103, UE108).

Liquid waste containing spent cyanide was also periodically discharged to the acid drain system between June 1970 and October 1971 (Reference UE103, UE114). During this time, approximately 176 pounds of cyanide was mixed with water and used as a rust

preventative (Reference UE103, UE108, UE114). The solution containing waste cyanide was typically mixed with calcium hypochlorite to destroy the cyanide prior to discharge to the acid drain system (Reference K302). However, on June 21, 1971, a tank of waste cyanide which had not been neutralized was apparently discharged accidentally to the acid drain which subsequently emptied into the Beta Ditch (Reference K302).

State Industries', permit to discharge industrial wastewater to surface waters (NPDES Permit No. NV 0000108) expired June 1, 1974 (Reference K298). After June 1, 1974, all wastes were to be ponded on-site (Reference K298).

State Industries operated two surface impoundments (SIs), "western" and "eastern", between June 1974 and December 1988 (Reference K161, K164, K171, K281, K298). The actual dates of operation of each SI are not known.

A May 1981 EPA Region IX inspection report and a March 23, 1982 letter from State Industries to the NDEP indicates that both surface impoundments (SIs) were lined with single liners consisting of PVC bottoms and reinforced butyl rubber sides. The western SI was circular and measured approximately 130 feet in diameter. The eastern SI was rectangular and measured approximately 150 feet by 250 feet (Reference K281, UE103).

The SIs received spent pickling process wastes (for solar evaporation) generated during the manufacture of water heaters (Reference K281, K282, K283). The process wastes were pumped to the SIs at a rate of approximately 35,000 gallons per month and included spent sulphuric acid, borax, soda ash (anhydrous sodium carbonate), phosphates (chemical combinations), and TURCO II H.T.C. soap (Reference ND053, ND054, UE103). A graduated stand pipe was used to record daily changes in SI levels and monitor these systems for leaks. Although the actual dates of operations of each SI are not known, records indicate that one of the SIs was in operation by September 1972, and both SIs were in operation on August 2, 1979; May 19, 1981; and March 23, 1982. The western SI was closed and covered by a 20,000 square foot warehouse in approximately late 1983. The eastern SI was closed by December 1988. Closure of the eastern SI was conducted by mixing the contents with soil until the material solidified (Reference K161, K164, K171, K281, K298, K357, UE103, UE114).

The actual dates of operation of each SI are not known. However, records indicate that one of the SIs was in operation by September 1972, and both SIs were in operation on August 2, 1979; May 19, 1981; and March 23, 1982. The western SI was closed and covered by a 20,000 square foot warehouse in approximately 1983. The eastern SI was closed by December 1988. Closure of the eastern SI was conducted by mixing the contents with soil until the material solidified (Reference 161, K164, K171, K281, K298, K357, UE103, UE114).

A State Industries inter-office correspondence dated August 14, 1980 indicated the need to report to EPA by August 18, 1980 that the wastewater discharged to a surface impoundment had a pH value of 1 (Reference K289). A subsequent letter from State Industries to the U.S. EPA Region IX dated November 3, 1980, requested that their status as treaters of hazardous waste be recinded because they had since studied their processes and determined that they were not creating a hazardous waste that needed treatment (Reference K290).

U.S. EPA and NDEP inspection reports for May 19, 1981, November 14, 1985, and January 15, 1987, indicate that sulfuric acid wastes were neutralized in a catch basin by injecting caustic soda to form wastewater with a pH greater than 2.0 prior to discharge to the SIs (Reference K281, K282, K283). However, some records indicate that there were instances where wastewater was discharged to the SIs (circa 1980 and prior) with a pH of approximately 1.0 (Reference K281, K289).

Limited trace metal analyses performed by State Industries on samples of wastewater in July 1981 and May 1982 revealed a high concentration of iron, detectable concentrations of total chromium and barium, and non-detectable concentrations of arsenic, cadmium, lead and selenium (Reference UE103, UE114).

Prior to closure of the eastern SI, sludge samples were collected and analyzed. Laboratory analysis of the sludge from the eastern SI in July 1988, by EP Toxicity procedures detected nonhazardous concentrations of arsenic, lead, nickel and selenium (Reference K171). State Industries subsequently managed the sludge as nonhazardous industrial solid waste based on the results of the EP Toxicity analyses (Reference K171).

Both surface impoundments have been closed. A State Industries letter to KMCC dated November 4, 1988, indicates that remedial action conducted on the eastern surface impoundment has been accepted by the EPA (Reference K171). An NDEP internal record of communication dated January 31, 1989, indicates that NDEP had no data on the closure (Reference K286).

One of the State Industries SIs is known to have leaked on three separate occasions between June 7 and December 10, 1974 (Reference K298, K300, K301). The reviewed documents do not indicate which SI (western or eastern) experienced the leakage. Discharges to the acid drain system were performed in order for State Industries to access and repair leaks in the SI liner (Reference K298, K300, K301).

Due to the high flow rates during the pond pump-out operation, discharges to the acid drain system apparently overflowed to the sanitary sewer (Reference K298). Documentation suggests that constituents of one of the SIs were discharged to the sanitary sewer via the acid drains on at least three occasions in 1974 to facilitate repairs to the liner after leaks were detected (Reference K295, K297, K298, K300, K301).

Review of U.S. EPA files revealed hand written notes dated May 15, 1980 which indicated State Industries had informed the NDEP of a ripped lining in an SI (Reference UE075).

7.4.2 Results and Analysis of Activity

State Industries use of portions of the KMCC property included construction and use of two surface impoundments for solar evaporation of liquid wastes and use of the acid drain system to periodically convey wastewater to the Beta Ditch. A May 1981 EPA Region IX inspection report and a March 23, 1982 letter from State Industries to the NDEP indicate that both SIs were lined with single liners consisting of PVC bottoms and reinforced butyl rubber sides. The western SI was circular and measured approximately 130 feet in diameter. The eastern SI was rectangular and measured approximately 150 feet by 250 feet (Reference K265, K281, K302, UE074, UE103).

A warehouse structure was constructed over the site of the westernmost impoundment in approximately 1983. Records were not found during this study regarding the method of abandonment of the this impoundment.

Between July 1988 and December 1988, the easternmost SI was abandoned in place by filling with soil (Reference K357). Prior to closure of this SI, sludge samples were collected and analyzed. Laboratory analysis of the sludge from the eastern SI in July 1988, by EP Toxicity procedures detected nonhazardous concentrations of arsenic, lead, nickel and selenium (Reference K171). State Industries subsequently managed the sludge as nonhazardous waste based on the results of the EP Toxicity analyses. Field observations during an August 20, 1991 SR, suggest that a sufficient protective cover in accordance with industrial waste regulations was not placed on the area of the former eastern SI during closure.

7.4.3 Potential or Known Releases or Environmental Impacts Related to Activity

Limited information has been found regarding the construction, use, and abandonment of the westernmost surface impoundment. This circular SI was lined with a single liner consisting of a PVC bottom and reinforced butyl rubber sides (Reference K281, UE103).

The construction of the easternmost surface impoundment included use of a single liner consisting of a PVC bottom and reinforced butyl rubber sides (Reference K281, UE103). During abandonment, the liner was reportedly left in place and soil was added and mixed with the contents to raise the area to existing grade. The presence of rust colored soils, several patches of yellow-white soil staining, and several pieces of liner material in the area of the former eastern SI represent visual evidence of the probable presence of former SI constituents on the land surface (Reference SR, August 20, 1991). These observations suggest that an engineered protective cover appropriate for the waste may not have been placed at the time of closure.

The potential exists for surficial constituents to migrate from the area of the former easternmost impoundment. Constituents exposed at the surface could migrate to the air pathway as particulates. These constituents could also migrate with surface water run-off. The run-off could either impact adjacent surface soil or enter nearby storm drains and empty into the Beta Ditch (Reference SR, August 20, 1991).

Several releases have been documented regarding one of the State Industries SIs. The liner leaked at least three times (June, July, and December 1974) and was subsequently repaired (Reference K298, K300, K301). The migration pathway of leakage from the

SIs would be subsurface soil. Migration to groundwater could have occurred given sufficient time and quantity of leakage during operation of the SIs. The amount of material that leaked is not known, however, the releases may have impacted the adjacent soils and shallow groundwater. The released fluids may have had a low pH (Reference K281, K289).

State Industries discharged their liquid waste to the acid drain system on several occasions through a connection in the southwest corner of Building T-5 (Reference UE114). Between June 1970 and September 1972, approximately 35,000 gallons of process wastes were discharged to the acid drain system each month (Reference UE103, UE108). During impoundment liner repairs in 1974, waste was pumped from the SI and diverted from the process area to the acid drain system on three occasions (Reference K298, K300, K301).

7.5 J. B. Kelley, Inc. Trucking (KMCC Tenant)

7.5.1 History and Description of Activity

Jack B. Kelley, Inc. (J. B. Kelley) has leased portions of the KMCC site for trucking related purposes. The lease initially operated as W. S. Hatch Company from March 1980 to August 1986 and as J. B. Kelley from September 1986 to present. The lease area has remained the same and includes Area B-8 and a portion of Area B-6 which are approximately 600 feet north of Unit 1 (Reference K263, K355; Plate 7-3).

The lease area encompasses an open gravel/soil covered area, concrete pads, and building foundations. This area is accessed by the entrance road which also provides access to Pioneer, BMI, Koch, and other entities (Reference SR, August 20, 1991; Plate 7-3).

The trucking related activities conducted by Hatch and Kelley have included the washing of truck exteriors, the washing of truck interiors, vehicle fueling, and minor repair work including oil changes. The trucks were fueled with diesel from an on-site 10,000-gallon fiberglass underground storage tank (UST). The waste oil was temporarily stored in an on-site 600-gallon porcelain ceramic lined UST (Reference K355).

Historically, the truck exteriors were washed at a truck wash area adjacent to the UST area and the washwater drained to a storm sewer drop inlet. The storm sewer conveyed the washwater to the Beta Ditch. This exterior truck washing, fueling, and maintenance area consisted of two 15 foot by 40 foot unbermed concrete pads. The area surrounding the pads consisted of an open gravel and soil covered area. This area also was formerly equipped with one 600-gallon porcelain ceramic lined underground storage tank (UST) with an attached sump for management of waste oil. In 1988, these trucking related washwater discharges to the storm sewer were discontinued at the request of KMCC and the storm drain was sealed. The truck exteriors were then washed in a soil and concrete covered area several hundred feet northwest of the former truck wash area in a location adjacent to the western side of a system of concrete vaults. This area was within the footprint of a former building and the truck washwater would have drained to the ground surface. These on-site activities were ceased in February 1991 (Reference K355, K358; SR, August 20, 1991).

Historically, the interior of selected trucks were also washed at this facility. Some of this rinsate was discharged to two metal tanks and/or a system of eight concrete vaults and some was discharged to the storm sewer. The concrete vaults consisted of eight larger and four smaller concrete vaults in an area measuring approximately 80 feet by 100 feet. The walls of the vaults were approximately 8 inches thick. Some of the vaults are hydraulically interconnected by small openings. The vault system appeared to be a portion of the remnant foundation of a building constructed and used during the U.S. Government operations. The southwesternmost vault contained two 1,000-gallon metal tanks (Reference K355, K357, K358; SR, August 20, 1991).

This tanker truck rinsate contained chemicals including lime, soda ash, barite, and magnesium chloride brine and may also have included dilute concentrations of ferric chloride, hydrochloric acid, sodium hydrosulfide, sodium hydroxide, and/or titanium tetrachloride. The rinsate (wastewater) was probably periodically neutralized with lime or soda ash and allowed to evaporate or was hauled off-site for disposal. These activities continued until approximately February 1991 when on-site wash activities ceased (Reference K355, K357, K358; SR, August 20, 1991).

7.5.2 Results and Analysis of Activity

The lessees use of this area between March 1980 and present has included the following activities (Reference K355):

- o use of a 10,000-gallon fiberglass UST to store diesel fuel;
- o use of a 600-gallon porcelain ceramic lined UST to store waste oil;
- o discharge of washwater (from washing the exterior of trucks) to both the storm sewer and the land surface and discharge of some solid residues to the land surface; and
- o discharge of rinsate containing dilute concentrations of various chemicals (from washing the interior of selected trucks) to the storm sewer, two metal tanks, and eight concrete vaults.

Trucks were fueled from a 10,000-gallon fiberglass UST containing diesel and waste oil was poured into a 600-gallon porcelain ceramic lined UST via a sump. The sump and 600-gallon UST were apparently a single unit design (Reference K355, K358).

On-site fueling operations were discontinued in June 1991 and the fuel and waste oil UST's removed. The UST sites are currently in the process of permanent closure. Both USTs removed on June 28, 1991 were found to have leaked. Surrounding petroleum hydrocarbon contaminated soils were excavated at the time of tank removal. At the time of an August 20, 1991 SR, the tanks had been removed from the site and the contaminated excavated soil was observed stored in stockpiles approximately 250 feet northeast of the truck wash area (Reference K355; SR, August 20, 1991).

The washing of truck exteriors, truck fueling, and minor repairs including oil changes has been conducted since March 1980. Historically, the exterior of trucks were washed at the truck wash area and the washwater would drain to a storm sewer drop inlet. The storm sewer conveyed the washwater to the Beta Ditch. These industrial wastewater discharges were discontinued in the summer of 1988 in response to a KMCC request. This storm sewer access was subsequently sealed. Since that time, the truck exteriors have been washed in a soil and concrete covered area several hundred feet northwest of the former truck wash area. This truck wash area is adjacent to the western side of the system of concrete vaults also operated by J.B. Kelley, Inc., and within the footprint of a former building. The practice of washing vehicles on-site was subsequently

discontinued between August 20, 1991 and October 18, 1991. Currently, the truck interiors and exteriors are washed at a nearby Magic Wand facility (Reference K263, K355; SR, August 20, 1991).

The tank washing practices consisted of rinsing the contents of certain tanker trucks into the metal tanks and concrete vaults. Some rinsate was also discharged to the storm sewer and to the ground on various occasions. The tanker trucks were rinsed to reduce corrosion and cross contamination between loads (Reference K263, K355).

Storm water run-on into the vault area is remote because the concrete vault walls extend approximately one foot above the surrounding soil and concrete. Storm water or tank rinsate run-off from these vaults would occur only if the vaults were filled and overtopped. Kleinfelder did not observe indications of such an event (overtopping) having occurred (Reference SR, August 20, 1991).

7.5.3 Potential or Known Releases or Environmental Impacts Related to Activity

Hydrocarbon releases occurred from both the 10,000-gallon diesel UST and the 600-gallon waste oil UST. The UST closure activities were being conducted for J.B. Kelley by an environmental contractor. The appropriate regulatory agencies were informed of the closure activities and were present during portions of the removal activities (Reference K355, K358; SR, August 20, 1991).

Kleinfelder did not find records of known releases of liquid waste from the eight concrete vaults which received truck tank washings. However, approximately a foot of a yellowish liquid remained in the bottom of four of the concrete vaults at the time of the August 20, 1991 site reconnaissance. Additionally, the dry vaults contained an unknown depth of sludge, presumably precipitates from the addition of lime and/or soda ash for neutralization. The vaults appeared to be constructed using cold joints between the walls and the floors and minor cracking of the concrete was evident. The metal tanks also contained some liquid. Minor seepage of liquid between the vaults was observed on August 20, 1991. This seepage was noted emanating from the base of a concrete wall separating a dry vault from an adjacent vault containing liquid waste approximately one foot deep (Reference SR, August 20, 1991).

The historic discharge of truck exterior washwater to the storm sewer system and the building pad represents known discharges. Washwater with soap and trace amounts of oil, grease, and diesel were periodically discharged to the storm sewer system between March 1980 and 1988 and the building pad between 1988 and 1991. The discharge paths would have involved the storm sewer system, the Beta Ditch, and surface soils.

Prior to early 1990, activities conducted in this area by J.B. Kelley, Inc. also included the routine sweeping or dumping of dry residues of bulk hauled materials onto the gravel covered lease area (Reference K355).

Storm water run-on/run-off from the area would flow onto this area from the south and flow towards a storm sewer drain located north-northeast of the former truck washing and maintenance facility.

7.6 Koch Materials Company (KMCC Tenant)

7.6.1 History and Description of Activities

Since May 1983, Koch Asphalt Company, also doing business as Koch Materials Company, has leased an area surrounding Building B-3 located north of the J. B. Kelley lease areas (Reference Plate 7-3). This lease was a continuation of an earlier lease with Burris Oil and Chemical Company, also doing business as Basic Resources Company, from May 1979 to May 1983 (Reference K263; SR September 18, 1991).

Operations at this lease area have historically consisted of an asphalt emulsion batch plant for blending and packaging of a variety of asphalt emulsions for uses such as tack coat for highway construction and sealers for asphalt surfaces. The production process involves milling of asphalt cement with soap emulsifiers and other additions to produce asphalt emulsion products. The asphalt, emulsifiers, and asphalt emulsion are stored in above ground storage tanks (AGST) on a bermed area (Reference K358).

7.6.2 Results and Analysis of Activities

Activities at this asphalt emulsion plant have resulted in spills and releases of petroleum hydrocarbon related materials including heavy oils/tars (Reference K164, K359; SR September 18, 1991).

The building and adjacent areas have concrete pads in place for storage of drums, building access, and general operations. Much of the lease area is comprised of a soil

covered surface and a tour of the AGST area, drum storage area, and warehouse indicate that housekeeping practices could be improved. The tank farm area is bermed but does not have concrete secondary containments. The soil was observed visibly stained at several on-site locations including the area adjacent to the transfer loading valves (Reference SR, September 18, 1991).

The AGST area is diked and the lease facility surrounded by embankments to prevent storm water run-off from leaving the property. However, several of the storage tanks currently sit directly on the ground and not on concrete. There was evidence that constituents had been released to the surrounding surface soils (Reference K359; SR, September 18, 1991).

7.6.3 Potential or Known Releases or Environmental Impacts Related to Activity

The size and number of soil stains around the tanks indicate that a number of spills have taken place. A standing pool of liquid resembling oil and water was also observed near the northeast corner of the lease area approximately 30 feet northeast of several above ground storage tanks (Reference SR, September 18, 1991).

Review of August 2, 1979 aerial photography shows a large area of stained soil was present along the north side of the access road which services this lease area (Reference K164). The area to the north side of the access road appeared to have been disturbed by plowing or other heavy equipment activity (Reference SR, September 18, 1991).

Additionally, a review of KMCC records indicates that an oily sheen was observed in the Beta Ditch on June 29, 1983. The source of this oily substance was subsequently traced to the Koch Asphalt facility. An oily substance had overflowed and entered the storm sewer system. This oily substance resulted from: 1) an accumulation of contaminated water from chemical solution tanks, leakage, and washout of chemical tanks, and 2) an overflow of asphalt cement (approximately 600 gallons) during a tank to tank transfer (Reference K359).

This spill was promptly report by KMCC to the appropriate regulatory agencies. Koch Asphalt responded by cleaning up the spill from within the diked area and grounds;

excavating and capping of the storm drain to prevent future spills to the storm sewer; and initiating procedural changes at the facility. Although the spill was cleaned up, records were not found regarding assessment of possible remaining contamination to the site soils, storm sewer, or Beta Ditch (Reference K359).

7.7 Nevada Precast Concrete Products (KMCC Tenant)

7.7.1 History and Description of Activities

Nevada Precast Concrete Products utilized office space near the J.B. Kelley operations (Reference Plate 7-3) from January 1973 to May 1978. Only office activities are believed to have been conducted at this site (Reference K263, K357).

7.7.2 Results and Analysis of Activities

Kleinfelder did not find documentation or other information to suggest that activities other than routine office activities were conducted by Nevada Precast Concrete Products at this site.

7.7.3 Potential or Known Releases or Environmental Impacts Related to Activity

Kleinfelder did not find evidence of releases or environmental impact due to Nevada Precast Concrete Products activities at this site (Reference SR, September 18, 1991).

7.8 Green Ventures International (KMCC Tenant)

7.8.1 History and Description of Activities

Green Ventures International leased the S-3 changehouse (Reference Plate 7-3) for use as a marketing office for alfalfa sprouts which were grown by the Green farming operation. The lease term was from August 1980 to September 1981 (Reference K263, K357).

7.8.2 Results and Analysis of Activities

Kleinfelder did not find documentation or other information to suggest that activities other than routine office and marketing activities were conducted by Green Ventures International at this site.

7.8.3 Potential or Known Releases or Environmental Impacts Related to Activity

Kleinfelder did not find evidence of releases or environmental impact due to Green Ventures International activities at this site (Reference SR, September 18, 1991).

7.9 Buckles Construction Company (KMCC Tenant)

7.9.1 History and Description of Activities

Ben Buckles leased a portion of Unit 1 for the Buckles Construction Company (Reference Plate 7-3) from August 1973 to June 1989 (Reference K263). Activities, including steel fabrication and equipment storage, were based in the northwest corner on the first floor in the "crane bay", area of Unit 1 (Reference K263).

7.9.2 Results and Analysis of Activities

Kleinfelder did not find documentation or evidence of hazardous material storage, fuel transfer, painting or solvent use sometimes associated with steel fabrication activities. The lease area had been cleaned since tenant activities ceased (Reference SR, September 18, 1991)

7.9.3 Potential or Known Releases or Environmental Impacts Related to Activity

Kleinfelder did not find documentation, information or visual evidence of releases or environmental impacts due to Buckles Construction Company's use of a portion of Unit 1 (Reference SR, September 18, 1991).

7.10 Ebony Construction Company (KMCC Tenant)

7.10.1 History and Description of Activities

Ebony Construction Company leased a portion of the KMCC property in 1977 and 1978 for construction management and staging activities. Their activities were based on the first floor, center of the north side of Unit 1 (Reference Plate 7-3) with offices, storage space, and direct outside access (Reference K263, K357).

7.10.2 Results and Analysis of Activities

Kleinfelder did not find documentation or evidence of fuel dispensing, truck washing, hazardous material storage, equipment cleaning, or waste disposal activities within this

lease area that are sometimes associated with construction activities (Reference SR, September 9, 1991).

Two soil stains were present immediately north of Unit 1 and appear to be the result of motor oil or diesel fuel dripping from parked vehicles possibly associated with tenant activities (Reference K357; SR, September 9, 1991).

7.10.3 Potential or Known Releases or Environmental Impacts Related to Activity

The observed stained soil consists of two areas near the large garage door type openings in the center of the north wall of Unit 1. One stain appeared to encompass an area of approximately 10 feet by 10 feet and the second stain appeared to encompass an area of approximately two feet by 10 feet. Both stains are located approximately three to five feet north of the Unit 1 building (Reference SR, September 9, 1991).

7.11 Flintkote Company (KMCC Tenant)

7.11.1 History and Description of Activities

Flintkote Company leased an above ground diesel storage tank from KMCC starting July 1973 and lasting approximately 2 years. The tank was located near the southwest corner of the Chemstar facilities (Reference Plate 7-3; K263; K357).

Flintkote Company is one of the corporate names associated with predecessors of Chemstar (Reference K180).

7.11.2 Results and Analysis of Activities

Kleinfelder did not find documentation or other information to evaluate the type of activities related to this tank. The tank has been removed and the area has been disturbed by more recent activities (Reference SR, September 18, 1991).

7.11.3 Potential or Known Releases or Environmental Impacts Related to Activity

Kleinfelder did not find documentation, information, or visual evidence to suggest the presence or absence of environmental impacts (Reference SR, September 18, 1991).

7.12 Delbert Madsen and Estate of Delbert Madsen (KMCC Tenant)

7.12.1 History and Description of Activities

Delbert Madsen leased a triangular shaped 2 acre parcel at the northern most, eastern corner of the KMCC property (Reference Plate 7-4) with an address shown as 1627 Athol Street. The original lease term was from June 1976 to June 1989, when Mr. Madsen's heir (Lavern Vohs) assumed the lease which is still valid (Reference K263; K357).

The area is currently being used as a storage and salvage yard for 1940s vintage transportable government housing, used mobile homes, old vehicles and wrecked vehicles (Reference SR, September 18, 1991).

7.12.2 Results and Analysis of Activities

Business activities at the site appear to be idle. Stored items included numerous old buildings on blocks, numerous vehicles, automobile gas tanks, batteries, and 55-gallon drums. Refuse was observed scattered throughout the area (Reference SR, September 18, 1991).

7.12.3 Potential or Known Releases or Environmental Impacts Related to Activity

The originally intended business (house moving) conducted at this site may have included storage of building materials commonly used in the 1940s. Asbestos from building materials, including insulation and stucco, may be present (Reference SR, September 18, 1991).

7.13 Southern Nevada Auto Parts (SNAP) Area (KMCC Tenant)

7.13.1 History and Description of Activity

Southern Nevada Auto Parts (SNAP) and related companies are conducting businesses related to used automobiles in a northeastern portion of the KMCC property (Reference Plate 7-4). A variety of names and companies have been associated with operations on this 10 acre portion of KMCC property (Reference K263; SR September 18, 1991).

Robert and William Ellis leased this area beginning in October 1972 doing business as SNAP-TOW, Southern Nevada Auto Parts, and Pick-A-Part (Reference K263). Ed Smith and Vern Christensen have been shown as lease holders since January 1990, doing business as Nevada Recycling (an auto salvage yard) on the northern portions of this area (Reference K263). The following companies are currently operating on the property (Reference SR, September 18, 1991):

- Southern Nevada Auto Parts, (an auto salvage yard);
- SNAP-TOW, (a tow service and auto impound yard);
- Pick-A-Part, (a do-it-yourself auto salvage yard); and
- Nevada Recycling (an auto salvage yard).

7.13.2 Results and Analysis of Activity

Activities at the auto impound yard within the southern portion of this lease area consist of storage of wrecked, police impounded, and repossessed vehicles. Operations also included insurance adjustment assessment and auction of wrecked vehicles. Soil staining appeared to be minor in this area (Reference SR, September 18, 1991).

Activities at the auto salvage yard at the northern and western portions of this lease area included buyer dismantling and retrieval of parts. Activities in this area have resulted in spills and releases of various vehicle fluids which may include motor oil, gasoline, anti-freeze, and battery acids (Reference SR, September 18, 1991).

In the auto storage areas, most of the vehicles were elevated 1 to 3 feet high on blocks or wheel rims. This would make it possible to drain fluids. On the western most portion of this lease area, vehicles were placed directly on the ground, without benefit of blocking. (Reference SR, September 18, 1991).

7.13.3 Potential or Known Releases or Environmental Impacts Related to Activity

During a September 18, 1991 site reconnaissance, conversations with attendants of the auto salvage area revealed that routine practice is to drain gasoline from tanks for reuse by site based vehicles. Vehicle batteries are also removed and placed on pallets for pick-up by a recycler as part of routine practices. A number of batteries were observed on pallets, some of which appeared to have cracked cases (Reference SR, September 18, 1991).

An area of soil staining was observed near the office during the September 18, 1991, SR. This area appeared to be used for storage of mechanical components such as transmissions, engines and differentials . An adjacent area was being used for storage of radiators and also exhibited soil staining (Reference SR, September 18, 1991).

7.14 Dillon Potter (KMCC Tenant)

7.14.1 History and Description of Activities

Since July 1972, Dillon Potter has leased a 2 acre portion of KMCC property southeast of the SNAP-TOW lease area (Reference Plate 7-4; K263). This lease area is used to maintain a limited number of livestock including horses, pigs, cattle, chickens, and peacocks (Reference K263, UE102; SR, September 18, 1991). In addition, there were approximately 25 old vehicles along the fence line on the north side of the property (Reference SR, September 18, 1991).

7.14.2 Results and Analysis of Activities

Current activities at this site appear to be limited to livestock feeding. The storage of old vehicles appears to be incidental and unchanged for a number of years (Reference SR, September 18, 1991).

7.14.3 Potential or Known Releases or Environmental Impacts Related to Activity

Use of this lease area for the feeding of livestock is not expected to create significant environmental impact. Kleinfelder did not observe soil stains associated with stored vehicles during a September 18, 1991 SR.

8.0 RECOMMENDATIONS

The following recommended actions are proposed by KMCC regarding the SWMUs (Chapter 5.0), known or suspected releases or spills (Chapter 6.0), and miscellaneous activities (Chapter 7.0) discussed in this report. KMCC makes these recommendations with the limitations noted in Section 2.4. Additional data or information may change the basis on which these recommendations are made. For convenience, the actions are summarized in Section 8.1. The reasons for the recommended action for each SWMU or each area are briefly discussed in Section 8.2.

8.1 Summary of Recommendations

Recommended Action	Section	SWMU Number	SWMU Name
NFS	5.1	KMCC-001	"Process Hardware" Storage Area Between Units 1 and 2
NFS	5.2	KMCC-002	Trash Storage Area North of Units 1 and 2
NFS	5.3	KMCC-003	PCB Storage Area - Unit 2
NFS	5.4	KMCC-004	Hazardous Waste Storage Area North of Unit 2
NFS	5.5	KMCC-005	Sodium Chlorate Filter Cake Holding Area No. of Unit 3
NFS	5.6	KMCC-006	Hazardous Waste Storage Area Between Units 3 and 4
NFS	5.7	KMCC-007	Platinum Drying Unit North of Unit 4
NFS	5.8	KMCC-008	Solid Waste Dumpsters
S	5.9	KMCC-009	Manganese Tailings Area

Legend:

C = Clean Area/Improve Housekeeping
S = Study
NFS = No Further Study under the terms of this current agreement
--- = Defer to BMI Common Area Report

Recommended Action	Section	SWMU Number	SWMU Name
NFS	5.29	KMCC-029	Satellite Accumulation Point - AP Maintenance Shop
NFS	5.30	KMCC-030	Storm Sewer System
NFS	5.31	KMCC-031	Acid Drain System

Recommended Action	Section	Section Spill/Release Designation
NFS	6.1	PCB Transformers
NFS	6.2	Unit 1 Tenants - Stains
NFS	6.3	Unit 2 Salt Redler
NFS	6.4	Unit 4 and Unit 5 Basements - Consent Agreement
NFS	6.5	Unit 6 Basements - Remediation Project
C	6.6	Diesel Storage Tank Area - Stains
NFS	6.7	Former Old Main Cooling Tower and Recirculation Lines
NFS	6.8	Leach Plant Area Manganese Ore Piles
S	6.9	Leach Plant Area Anolyte Tanks
S	6.10	Leach Plant Area Sulfuric Acid Storage Tank
S	6.11	Leach Plant Area Leach Tanks
S	6.12	Leach Plant Area Transfer Lines To/From Unit 6
NFS	6.13	AP Plant Area Screening Building, Dryer Building, and Associated Sump
NFS	6.14	AP Plant Area Tank Farm
S	6.15	AP Plant Area Change House/Laboratory Septic Tank
NFS	6.16	AP Plant Area Storage Pads - Fire
NFS	6.17	AP Plant Area Old Building D-1 - Wash Down

Legend:

C = Clean Area/Improve Housekeeping
S = Study
NFS = No Further Study under the terms of this current agreement
--- = Defer to BMI Common Area Report

Recommended Action	Section	Section Spill/Release Designation
NFS	6.18	AP Plant Area New Building D-1 - Wash Down
NFS	6.19	AP Plant SIs and Transfer Lines to/From AP SIs
NFS	6.20	AP Plant Transfer Lines to Sodium Chlorate Process
---	7.1	BMI Common Area Disposal (Upper and Lower BMI Ponds)
---	7.2	BMI Common Area Disposal (BMI Landfill)
NFS	7.3	Old Sodium Chlorate Plant Decommissioning
S	7.4	State Industries, Inc. (KMCC Tenant)
C	7.5	J. B. Kelley, Inc. Trucking (KMCC Tenant)
C	7.6	Koch Materials Company (KMCC Tenant)
NFS	7.7	Nevada Precast Concrete Products (KMCC Tenant)
NFS	7.8	Green Ventures International (KMCC Tenant)
NFS	7.9	Buckles construction Company (KMCC Tenant)
NFS	7.10	Eboney Construction Company (KMCC Tenant)
NFS	7.11	Flintkote Company (KMCC Tenant)
C	7.12	Delbert Madsen & Estate of Delbert Madsen (KMCC Tenant)
C	7.13	Southern Nevada Auto Parts (SNAP) Area (KMCC Tenant)
NFS	7.14	Dillon Potter (KMCC Tenant)

Legend:

C = Clean Area/Improve Housekeeping
S = Study
NFS = No Further Study under the terms of this current agreement
--- = Defer to BMI Common Area Report

8.2 RECOMMENDATIONS

WASTE MANAGEMENT UNITS AND AREAS

5.1 "Process Hardware" Storage Area Between Units 1 and 2.....NFS

This SWMU is being operated in conformance with good operating practices in the industry. Further assessment of this SWMU is not recommended.

5.2 Trash Storage Area North of Units 1 and 2 .....NFS

This SWMU is being operated in conformance with good operating practices in the industry. Further assessment of this SWMU is not recommended.

5.3 PCB Storage Area - Unit 2 .....NFS

This SWMU is being operated in accordance with good operating practices and applicable requirements of 40 CFR, part 761 (Reference Doc. UE016; SR, August 19, 1981). Further assessment of this SWMU is not recommended.

5.4 Hazardous Waste Storage Area North of Unit 2.....NFS

Further assessment of this SWMU is not recommended. The small amount of oil stained soils observed near the south edge of this SWMU has been removed.

5.5 Sodium Chlorate Filter Cake Holding Area North of Unit 3 .....NFS

Assessment of the current SWMU is not recommended. Materials associated with the previous drying pad have been properly disposed.

5.6 Hazardous Waste Storage Area Between Units 3 and 4 .....NFS

The present good housekeeping practices reduce the potential for accumulation of the waste on the asphalt. Further assessment of this SWMU is not recommended.

5.7 Platinum Drying Unit North of Unit 4.....NFS

Operating practices have been revised to control the volume of material within this SWMU. The area has been cleaned. KMCC is installing a filtering process that will eliminate the platinum drying unit. Further assessment of this SWMU is not recommended.

5.8 Solid Waste Dumpsters.....NFS

This SWMU is being operated in conformance with good operating practices in the industry. Further assessment is not recommended.

5.9 Manganese Tailings Area .....S

KMCC will sample this area to evaluate whether historic (pre-February 1975) manganese tailings management practices have impacted the area.

5.10 Old P-2 Surface Impoundment .....S

KMCC will sample this SWMU as part of closure of the former pond site.

5.11 C-1 Surface Impoundment .....NFS

This SWMU is being operated in conformance with good operating practices in the industry. Small pressure relief holes in the pipeline have been plugged. The pond has been scheduled to be removed from service as a part of KMCC's goal to eliminate non-essential facility ponds. Further assessment can be deferred until closure.

5.12 Mn-1 Surface Impoundment .....NFS

This SWMU is being operated in conformance with good operating practices in the industry. Further assessment of this SWMU is not recommended.

5.13 Hazardous Waste Landfill (Closed) .....NFS

This SWMU is currently under RCRA post-closure care and monitoring. An application for a permit for this SWMU has been on file with NDEP.

5.14 Trade Effluent Settling Ponds (U.S. Government Operations) .....S

Additional data will be collected to evaluate the current status of the surface soil at the former pond site.

5.15 WC-1 (WC-West) Surface Impoundment .....NFS

This SWMU is being operated in conformance with good operating practices in the industry. The construction plans for this newly built, double-lined pond were approved by NDEP. Further assessment of this SWMU is not recommended.

5.16 WC-2 (WC-East) Surface Impoundment .....NFS

This SWMU is being operated in conformance with good operating practices in the industry. The construction plans for this newly built, triple-lined pond were approved by NDEP. Further assessment of this SWMU is not recommended.

5.17 Ammonium Perchlorate (AP) Area - Pad 35.....NFS

This SWMU is being operated in conformance with good operating practices in the industry. Housekeeping is being improved in this area. Further assessment is not recommended.

5.18 Drum Crushing Area .....NFS

This SWMU is being operated in conformance with good operating practices in the industry. Housekeeping in the area is being improved to reduce small spills. Further assessment of this SWMU is not recommended.

5.19 Groundwater Remediation Unit .....NFS

This SWMU is part of an ongoing Consent Agreement with NDEP for remediation of chromium contaminated groundwater. Housekeeping practices are being improved. Assessment of this unit can be managed under the existing Consent Agreement.

5.20 The Beta Ditch .....S

Additional data will be collected as part of the common area evaluation.

5.21 Sodium Perchlorate Platinum By-Product Filter - Unit 5 .....NFS

This SWMU is being operated in conformance with good operating practices in the industry. The containment area has been sealed to reduce minor leaks and housekeeping has been improved. Further assessment of this SWMU is not recommended.

5.22 Former Manganese Tailings Area .....S

Sampling will be performed to evaluate whether historic tailings management practices impacted the area.

5.23 Closed Surface Impoundment S-1 .....NFS

This SWMU has been certified Clean Closed by NDEP.

5.24 Closed Surface Impoundment P-1 .....NFS

This SWMU has been certified Clean Closed by NDEP.

5.25 Truck Emptying/Dump Site .....NFS

Small quantities of lime and soda ash materials have been blended with the existing soil and vehicular access to the area has been restricted. Further assessment of this SWMU is not recommended.

5.26 Former Satellite Accumulation Point - Unit 3, Maintenance Shop .....NFS

This SWMU is no longer in existence. Further assessment is not recommended.

5.27 Former Satellite Accumulation Point - Unit 6, Maintenance Shop.....NFS

This SWMU no longer exists. Further assessment is not recommended.

5.28 Satellite Accumulation Point, AP - Laboratory.....NFS

This SWMU is being operated in conformance with good operating practices and applicable requirements of 40 CFR 262.34. Further assessment is not recommended.

5.29 Satellite Accumulation Point, AP Maintenance Shop.....NFS

This SWMU is being operated in conformance with good operating practices and applicable requirements of 40 CFR 262.34. Further assessment is not recommended.

5.30 Storm Sewer System.....NFS

The storm sewers on KMCC property are monitored as a part of the KMCC NPDES permit.

5.31 Acid Drain System.....NFS

The acid drains on KMCC property are monitored as a part of the KMCC NPDES permit.

KNOWN OR SUSPECTED RELEASES OR SPILLS

6.1 PCB Transformers.....NFS

Further assessment of this spill is not necessary. Past response and clean-up actions were prompt, comprehensive, and responsible resulting in complete removal of contaminated concrete.

6.2 Unit 1 Tenants - Stains.....NFS

Cleanup of the area has been completed by removing the soils.

6.3 Unit 2 Salt Redler.....NFS

Further assessment of the Unit 2 Salt Redler is not recommended. Spills of solid sodium chloride are cleaned up promptly and housekeeping has been improved.

6.4 Unit 4 and Unit 5 Basements - Consent Agreement.....NFS

The existing 1986 Consent Order addresses remediation. Further assessment is not recommended.

6.5 Unit 6 Basements - Remediation Project .....NFS

The existing 1986 Administrative Order addresses remediation. Further assessment is not recommended.

6.6 Diesel Storage Tanks Area - Stains.....C

Areas of stained soil will be removed for off-site treatment/disposal and the underlying soil will be tested and remediated as required by NDEP. The tank has been taken out of service, the contents removed, and the interior cleaned.

6.7 Former Old Main Cooling Tower and Recirculation Lines.....NFS

Assessment of impacts is not needed since primarily only naturally occurring dissolved salts are involved and constant discharge of high salt concentrations did not occur. Impact to groundwater by the small concentration of hexavalent chromium in the cooling tower water should be captured and treated by the KMCC groundwater remediation unit. Further assessment is not necessary as a separate assessment, since this will be addressed in conjunction with evaluation of the Beta Ditch.

6.8 Leach Plant Area Manganese Ore Piles.....NFS

Manganese dioxide ore is a naturally occurring material which has a very low solubility in water. Further assessment of this area is not recommended.

6.9 Leach Plant Area Anolyte Tanks .....S

KMCC will assess this area.

6.10 Leach Plant Area Sulfuric Acid Storage Tank.....S

KMCC will assess this area.

6.11 Leach Plant Area Leach Tanks.....S

KMCC will assess this area.

6.12 Leach Plant Area Transfer Lines To/From Unit 6 .....S

KMCC will assess this area.

6.13 AP Plant Area Screening Building, Dryer Building, and Associated Sump .....NFS

The area has been cleaned and both housekeeping and drainage have been improved. Further assessment is not necessary.

6.14 AP Plant Area Tank Farm .....NFS

Area has been cleaned and housekeeping will be improved to address spills. Further assessment is not recommended.

6.15 AP Plant Area Change House/Lab Septic Tank .....S

The septic system receives only trace quantities of chemical from washwater, however KMCC will sample this area.

6.16 AP Plant Area Storage Pads - Fire .....NFS

This area was cleaned following the fire in July 1990 and further assessment is not recommended.

6.17 AP Plant Area Old Building D-1 - Wash Down.....NFS

This area is no longer used but in the past appeared to be operated in conformance with good operating practices in the industry. Further assessment is not recommended.

6.18 AP Plant Area New Building D-1 - Wash Down.....NFS

Further assessment of potential impacts from new D-1 building activities is not necessary due to the short period of operation and implementation of good operating practices.

6.19 AP Plant SIs and Transfer Lines To/From AP SIs.....NFS

Further assessment of potential impacts from past releases from these transfer lines is not necessary because the releases are small. Evaluation of the SIs should be deferred until closure.

6.20 AP Plant Transfer Lines to Sodium Chlorate Process .....NFS

Further assessment of potential impacts from the former releases of sodium hypochlorite from these transfer lines should not be necessary because the releases were small.

MISCELLANEOUS ACTIVITIES

7.1 BMI Common Area Disposal (Upper and Lower BMI Ponds)

This area will be addressed in the Common Area Report.

7.2 BMI Common Area Disposal (BMI)

This area will be addressed in the Common Area Report for this area.

7.3 Old Sodium Chlorate Plant Decommissioning ..... NFS

The old sodium chlorate plant decommissioning was conducted by May 1992 under guidelines for RCRA waste where applicable. Further assessment is not recommended.

7.4 State Industries, Inc. (KMCC Tenant) ..... S

Soil will be assessed in the former pond locations.

7.5 J. B. Kelley, Inc. Trucking (KMCC Tenant) C

KMCC will work with the tenant to improve housekeeping.

7.6 Koch Materials Company (KMCC Tenant) C

KMCC will work with the tenant to improve housekeeping.

7.7 Nevada Precast Concrete Products (KMCC Tenant) ..... NFS

Further assessment of this area is not recommended.

7.8 Green Ventures International (KMCC Tenant) ..... NFS

Further assessment of this area is not recommended.

7.9 Buckles Construction Company (KMCC Tenant) ..... NFS

KMCC has cleaned this area. Further assessment of this area is not recommended.

7.10 Eboney Construction Company (KMCC Tenant) ..... NFS

Further assessment of this area is not recommended.

7.11 Flintkote Company (KMCC Tenant) ..... NFS

Further assessment of this area is not recommended.

7.12 Delbert Madsen & Estate of Delbert Madsen (KMCC Tenant) C

KMCC will work with the tenant to improve housekeeping.

7.13 Southern Nevada Auto Parts (SNAP) Area (KMCC Tenant) C

KMCC will work with the tenant to improve housekeeping.

7.14 Dillon Potter (KMCC Tenant) ..... NFS

Further assessment of this area is not recommended.

APPENDIX A
REFERENCES

APPENDIX A

REFERENCES

Appendix A represents a list of references obtained from interviews and document searches from Kerr-McGee Chemical Corporation files and a variety of other sources.

For the purpose of internal record keeping and subsequent referencing, an alpha numeric code was assigned to each document. The alpha portion of the alpha numeric code corresponds to the source where the document was reviewed or obtained. The number portion of the code represents an arbitrary number assigned to the reference.

The following is a list of sources from which references were obtained or reviewed. The list denotes the source of the reference and the abbreviation used in the alpha portion of the alpha numeric code.

Alpha Code	Reference Source
K	Kerr-McGee
T	Timet
N	Nevada Colorado River Commission
ND	Nevada Division of Environmental Protection
CE	Clark County Health District - Environmental Health
CA	Clark County Health District - Air Pollution Control Division
UB	U.S. Bureau of Reclamation
UE	U.S. EPA Region IX
UN	University of Nevada Las Vegas - Environmental Research Center
NO	Nevada OSHA
GL	Gibson Library, Henderson, Nevada
GM	Geraghty & Miller, Inc.
UL	UNLV Library, Las Vegas, Nevada
OT	Other

The accompanying list reflects references cited throughout the report and is arranged alpha numerically.

REF.#: C001
DATE: 09/02/70
TO: Glen Taylor
COMPANY: Basic Management, Inc.
FROM: William H. Blackmer
COMPANY: Montgomery Engineers of Nevada
TITLE: Preliminary - "Basic Management, Inc., Lake Mead Pollution Study".

REF.#: C002
DATE: 03/18/76
TO: Alan Gaddy
COMPANY: KMCC
FROM: Starr Curtis
COMPANY: Chemstar Lime
TITLE: "B.M.I. Dumping Area, Solid Waste". Scale 1 inch equals 100 feet. Dated 3/18/76.

REF.#: CA001
DATE: 11/03/09
TO: Harold A. Bres
COMPANY: District Health Department
FROM: W. H. Voorheis
COMPANY: KMCC
TITLE: Letter notifying Dist. Air Pollution Control Board of intent to demolish building D-2.

REF.#: CA002
DATE: 01/12/79
TO: Charles Armstrong
COMPANY: KMCC
FROM: Harold A. Bres, Jr.
COMPANY: Clark County Health District
TITLE: List of emission points observed and for which operating permits exist presently or will be issued.

REF.#: CA017
DATE: 09/19/79
TO: Harold A. Bres
COMPANY: CCHD-APCD
FROM: R. F. Wohletz
COMPANY: KMCC
TITLE: Response to questions concerning production ratios and consumption of raw materials and certain other items.

REF.#: DR001
DATE: 04/00/72
TO:
COMPANY:
FROM: J.A. Westphal and W.E. Nork
COMPANY: Desert Research Institute
TITLE: "Reconnaissance Analysis of Effects of Waste-Water Discharge on The Shallow Ground-Water Flow System, Lower Las Vegas Valley, Nevada".

REF.#: DR002
DATE: 01/00/76
TO:
COMPANY: United States Bureau of Reclamation
FROM: Richard L. Bateman
COMPANY: Desert Research Institute
TITLE: "Analysis of Effects of Modified Waste-Water Disposal Practices on Lower Las Vegas Wash".

REF.#: DR003
DATE: 12/00/76
TO: Frederic Hoffman
COMPANY: EPA
FROM: Ralph O. Patt
COMPANY: Desert Research Institute
TITLE: "Las Vegas Valley Water Budget: Relationship of Distribution , Consumptive Use, and Recharge to Shallow Ground Water".

REF.#: DR004
DATE: 12/00/76
TO: Frederic Hoffman
COMPANY: EPA
FROM: Robert F. Kaufmann
COMPANY: Desert Research Institute
TITLE: "Land and Water Use Effects on Groundwater Quality in Las Vegas Valley".

REF.#: DR005
DATE: 03/00/80
TO:
COMPANY:
FROM: Alan Schmidt and John W. Hess
COMPANY: Desert Research Institute
TITLE: "Nitrogen and Phosphorus Hydrochemistry in Las Vegas Wash".

REF.#: DR006
DATE: 10/00/90
TO: Jane E. Denne
COMPANY: Environmental Monitoring Systems Laboratory
FROM: Karl F. Pohlmann and others
COMPANY: Desert Research Institute, Water Resource Center
TITLE: "Field Comparison of Ground-Water Sampling Devices For hazardous Waste Sites: An Evaluation Using Volatile Organic Compounds".

REF.#: DR007
DATE: 11/01/71
TO: Frederic Hoffman
COMPANY: EPA
FROM: Robert F. Kaufmann
COMPANY: Desert Research Institute
TITLE: Effects of Basic management Incorporated Effluent Disposal on the Hydrogeology and Water Quality of the Lower Las Vegas Wash Area, Las Vegas, Nevada.

REF.#: GL002
DATE: 04/21/47
TO: General Public
COMPANY:
FROM:
COMPANY: Gibson Library (Newspaper)
TITLE: "Basic Management Project Now 30 Percent Occupied".

REF.#: GM001
DATE: 10/20/44
TO:
COMPANY: U.S. Government
FROM: E.H. Clary
COMPANY: Basic Magnesium Inc.
TITLE: Plan view map of the Basic Magnesium Inc. Trade Effluent Disposal Ponds and surrounding area.

REF.#: GM002
DATE: 00/00/44
TO:
COMPANY: U.S. Government
FROM:
COMPANY: U.S. Government
TITLE: Cross section views (maps) for construction of various portions of the trade effluent disposal ponds, Reference #N-35.

REF.#: GM003
DATE: 05/11/67
TO: General Public
COMPANY:
FROM:
COMPANY: Henderson Home News
TITLE: "BMI Digs Trenches For Waste Dump".

REF.#: GM004
DATE: 08/07/80
TO: General Public
COMPANY:
FROM:
COMPANY: Las Vegas Review-Journal
TITLE: Two articles, (1) "Chemical waste dump potentially hazardous"; and (2) "HAZARDOUS".

REF.#: K003
DATE: 05/26/72
TO: R.L. O'Connell
COMPANY: USEPA
FROM: James J. Kelley
COMPANY: KMCC
TITLE: Reply to May 19, 1972 letter requesting information on Corporations plan for compliance with the controlling water quality standards for effluent discharge from the Henderson Plant.

REF.#: K013
DATE: 12/16/74
TO: R. L. O'Connell
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Project Completion Schedule.

REF.#: K017
DATE: 04/29/75
TO: Frank M. Covington
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Quarterly discharge report for period 1/1/75 through 3/31/75.

REF.#: K020
DATE: 10/24/75
TO: Gentlemen
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: "NV0000078 Effective August 30, 1975".

REF.#: K022
DATE: 03/04/76
TO: Glen C. Taylor
COMPANY: Basic Management Incorporated
FROM: R.F. Wohletz
COMPANY: KMCC
TITLE: Quantity of solid waste disposed of in the BMI dump.

REF.#: K031
DATE: 03/22/79
TO: W. Marvin Tebeau
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Response to request of February 23, 1979 and listing of pond specifications.

I

REF.#: K032
DATE: 04/10/79
TO: Mr. Gregory
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Response to order dated March 27, 1979; discharge dates from pond C-1.

REF.#: K033
DATE: 05/03/79
TO: Don Detomasi
COMPANY: KMCC
FROM: E.S. Troscinski
COMPANY: Nalco Chemical Company
TITLE: Material Safety Data Sheets.

REF.#: K034
DATE: 01/03/80
TO: Marvin Tebeau
COMPANY: NDEP
FROM: R.F. Wohletz
COMPANY: KMCC
TITLE: Report on flow of 1 to 1.5 million gallons on non-hazardous material from cooling tower due to power failure.

REF.#: K037
DATE: 05/02/80
TO: Clyde B. Eller
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Background information on KMCC including ownership information, products produced, wastes produced, where wastes went, etc.

REF.#: K038
DATE: 05/14/80
TO: Marvin Tebeau
COMPANY: NDEP
FROM: R.F. Wohletz
COMPANY: KMCC
TITLE: Emergency discharge from cooling tower.

REF.#: K039
DATE: 07/18/80
TO: Clyde B. Eller
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Response to waste related operations and the solid and liquid waste produced by the operations.

REF.#: K046
DATE: 05/08/81
TO: Marvin Tebeau
COMPANY: NDEP
FROM: R.F. Wohletz
COMPANY: KMCC
TITLE: Request to start use of once-through cooling water earlier this year.

REF.#: K054
DATE: 02/01/82
TO:
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Discharge Monitoring Report.

REF.#: K055
DATE: 03/26/82
TO: Steve Pia
COMPANY: KMCC
FROM: Julian Bielawski
COMPANY: NDEP
TITLE: NPDES Compliance Inspection Report.

REF.#: K056
DATE: 03/31/82
TO: L. H. Dodgion
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Additional information answering questions in the Order of February 25, 1982. Also attachments of previous correspondence, applications and miscellaneous items.

REF.#: K057
DATE: 04/28/82
TO:
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Discharge Monitoring Report.

REF.#: K058
DATE: 05/14/82
TO: Bill Wilson
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: First Quarter 1982 RCRA Groundwater Monitoring Data.

REF.#: K059
DATE: 05/21/82
TO: LaVerne Rosse
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Response to NDEP's Order.

REF.#: K060
DATE: 05/28/82
TO: Marvin Tebeau
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Pond Leak Detection Program.

REF.#: K061
DATE: 06/04/82
TO: L. H. Dodgion
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Estimated water balance for KMCC (1981).

REF.#: K062
DATE: 07/14/82
TO: William D. Wilson
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Revised Part A Permit Application.

REF.#: K063
DATE: 07/14/82
TO: William D. Wilson
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Revised Part A Application. This is a repeat of document number K062. Note that K063 has one more page included in the Part A Permit Application that is attached.

REF.#: K064
DATE: 07/29/82
TO: Marvin Tebeau
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Quarterly Discharge Monitoring Report.

REF.#: K065
DATE: 08/17/82
TO: Marvin Tebeau
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Response about Pond Monitoring System. Pond AP-2 leaked in 1979.

REF.#: K066
DATE: 08/17/82
TO: Bill Wilson
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Second Quarter 1982 RCRA Groundwater Monitoring Data.

REF.#: K068
DATE: 10/26/82
TO: Bill Wilson
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: Second Quarter 1982 RCRA Groundwater Monitoring Data.

REF.#: K069
DATE: 10/27/82
TO: Marvin Tebeau
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Quarterly Discharge Monitoring Report.

REF.#: K070
DATE: 01/03/83
TO: Inter office memo
COMPANY: KMCC
FROM: J.C. Stautner
COMPANY: KMCC
TITLE: RCRA Groundwater Monitoring Requirements, 1983.

REF.#: K070A
DATE: 01/20/83
TO: Harry Van Drielen
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: January 16, 1983 reportable spill.

REF.#: K071
DATE: 01/21/83
TO: LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Closure Plan for Hazardous Waste Landfill.

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REF.#: K077
DATE: 02/24/83
TO: Bill Wilson
COMPANY: USEPA
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Third quarter 1982 RCRA ground water monitoring data.

REF.#: K079
DATE: 06/00/82
TO: Unknown
COMPANY: KMCC
FROM: Unknown
COMPANY: KMCC
TITLE: Explanation of Geological and Well Construction Data, KMCC RCRA Interim Status Groundwater Monitoring Program.

REF.#: K083
DATE: 06/09/83
TO: Bill Wilson
COMPANY: USEPA
FROM: R.B. Chase
COMPANY: KMCC
TITLE: P-1 closure/post-closure plan.

REF.#: K084
DATE: 07/01/83
TO: Unknown
COMPANY: KMCC
FROM: Unknown
COMPANY: KMCC
TITLE: Update on Ground Water Assessment.

REF.#: K091
DATE: 02/01/84
TO: H. LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Groundwater Monitoring. Traced chrome contamination to basements of Units 4 and 5.

REF.#: K092
DATE: 03/07/84
TO: H. LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: RCRA groundwater monitoring results; logs and construction details; and a response to a letter regarding repairs in the basements of Units 4 and 5.

REF.#: K095
DATE: 04/05/84
TO: H. LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Revised Closure and Post-Closure Plans For Surface Impoundments S-1 and P-1.

REF.#: K104
DATE: 07/13/84
TO: Thomas J. Fronapfel
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Additional samples of the chlorate storage site located in the basement of Unit 6.

REF.#: K104A
DATE: 08/02/84
TO: NDEP file
COMPANY: KMCC
FROM: F.R. Stater
COMPANY: KMCC
TITLE: July 31, 1984 reportable sulfuric acid spill.

REF.#: K105
DATE: 09/26/84
TO: Thomas J. Fronapfel
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Closure/Post-Closure Plan for P-1 and S-1.

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REF.#: K106
DATE: 10/04/84
TO: LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: RCRA Ground Water Monitoring.

REF.#: K108
DATE: 10/25/84
TO: H. LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Revision of closure/post-closure plan for hazardous waste landfill.

REF.#: K111
DATE: 03/07/85
TO: Thomas J. Fronapfel
COMPANY: NDEP
FROM: R.F. Stater
COMPANY: KMCC
TITLE: Requesting written approval to use the "non-hazardous" waste disposal site on KMCC's Henderson Facility for disposal of manganese tails and other debris and building rubble from demolition.

REF.#: K112
DATE: 04/16/85
TO: R.B. Chase
COMPANY: KMCC
FROM: Tom Fronapfel
COMPANY: NDEP
TITLE: No comments received during public comment period, closure activities for the landfill may begin.

REF.#: K117
DATE: 07/01/85
TO: Joe Livak
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Additional information about KMCC's operations for rewrite of KMCC NPDES

Permit.

REF.#: K123
DATE: 09/04/85
TO: Thomas J. Fronapfel
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Letter documenting activities for closure of surface impoundment S-1.

REF.#: K124
DATE: 09/06/85
TO: Tom Fronapfel
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: NDEP
TITLE: Letter documenting activities for closure of surface impoundment P-1.

REF.#: K126
DATE: 10/21/85
TO: P.S. Corbett
COMPANY: KMCC
FROM: Fronapfel
COMPANY: NDEP
TITLE: One week extension for certificate of closure of hazardous waste landfill.

REF.#: K126A
DATE: 10/21/85
TO: LaVerne Rosse
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: RCRA ground water monitoring results from samples collected on July 5, 1985.

REF.#: K128
DATE: 10/22/85
TO: Tom Fronapfel
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: Completed closure of hazardous waste landfill. Kleinfelder report of activities and closure/post-closure plan.

REF.#: K130
DATE: 11/20/85
TO: Phillip Bobel
COMPANY: USEPA
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Response to information requests. Part B application submittal.

REF.#: K131
DATE: 12/05/85
TO: R.B. Chase
COMPANY: KMCC
FROM: Tom Fronapfel
COMPANY: NDEP
TITLE: SIs S-1 and P-1 closed in accordance with closure plan. The landfill was not closed in accordance with closure plan.

REF.#: K137
DATE: 12/31/85
TO: Joe Livak
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: "NPDES Quarterly Monitoring Report, Permit NV 0000078".

REF.#: K138
DATE: 01/17/86
TO: P.S. Corbett
COMPANY: KMCC
FROM: Tom Fronapfel
COMPANY: NDEP
TITLE: Hazardous Waste Landfill closed in accordance with closure plan.

REF.#: K140A
DATE: 02/26/86
TO: LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: February 25, 1986 reportable anolyte spill.

REF.#: K142
DATE: 04/02/86
TO: B. Hoffman
COMPANY: KMCC
FROM: S.M. Crowley
COMPANY: KMCC
TITLE: Information on hazardous waste landfill (from closure/post-closure plan) to prepare a recordable document (plat).

REF.#: K146A
DATE: 06/10/86
TO: Mr. Dodgion
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Plans and schedule for the elimination of the subject surface discharges from the cooling tower.

REF.#: K146B
DATE: 06/11/86
TO: LaVerne Rosse
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: RCRA Ground Water Monitoring Results from samples collected on January 2 and 21, 1986.

REF.#: K146C
DATE: 09/16/86
TO: Mr. Chase
COMPANY: KMCC
FROM:
COMPANY: NDEP
TITLE: Order and Finding. Unit 6 Discharge Mitigation.

REF.#: K147
DATE: 09/29/86
TO: Harry Seraydarian
COMPANY: USEPA
FROM: R.B. Chase
COMPANY: KMCC
TITLE: Information regarding potential releases from solid waste management units.

REF.#: K153
DATE: 06/08/87
TO: LaVerne Rosse
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: RCRA Ground Water Monitoring results of samples collected on January 7, 1987.

REF.#: K155
DATE: 02/25/88
TO: LaVerne Rosse
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: RCRA Ground Water Monitoring Results from samples collected in January, 1988.

REF.#: K158
DATE: 08/11/89
TO: LaVerne Rosse
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: RCRA ground water monitoring results from samples collected on 6/22/89.

REF.#: K158A
DATE: 07/18/90
TO: Alan Gaddy
COMPANY: KMCC
FROM: Kent R. Neddenriep
COMPANY: KMCC
TITLE: June 8, 1988 Permit to Discharge and July 18, 1990 Leak Detection Plan approval.

REF.#: K158B
DATE: 07/18/90
TO: Gentlemen
COMPANY: National Response Center
FROM: F.R. Stater
COMPANY: KMCC
TITLE: July 12, 1990 reportable spill. Fire in AP production area.

REF.#: K160
DATE: 12/21/42
TO:
COMPANY: U.S. Government
FROM: W.B. Dyer
COMPANY: Basic Magnesium Inc.
TITLE: Sanitary Sewer Map.

REF.#: K161
DATE: 07/03/87
TO:
COMPANY: KMCC
FROM: Vern W. Cartwright (Photogrammetric Surveyor #82)
COMPANY:
TITLE: Topographic map of KMCC. Scale equals 1" = 200'.

REF.#: K163
DATE: 00/00/42
TO:
COMPANY: U.S. Government
FROM:
COMPANY: Basic Magnesium Inc.
TITLE: Acid Drain Map.

REF.#: K164
DATE: 07/00/80
TO:
COMPANY: USEPA
FROM:
COMPANY: Environmental Monitoring Systems Lab (EMSL-LV)
TITLE: "Aerial Surveys of Hazardous Waste Disposal, Point and Nonpoint Source Pollution Features Within and Adjacent to BMI Complex". Additionally, "Development of Hazardous Waste Disposal, Point, and Nonpoint Source (NPS)

Pollution Features Within and Adjacent to the BMI Complex From 1943 to 1979".

REF.#: K165
DATE: 03/11/82
TO:
COMPANY: KMCC
FROM: Andrew S. McCreath & Son, Inc.
COMPANY: Compagnie Miniere de l'Ogooue
TITLE: Manganese ore analyses.

REF.#: K167
DATE: 07/00/85
TO: R.B. Chase
COMPANY: KMCC
FROM: Bert J. Smith
COMPANY: KMCC
TITLE: Hydrogeological Investigation, KMCC - Henderson Facility.

REF.#: K168
DATE: 07/09/85
TO:
COMPANY: USEPA
FROM:
COMPANY: KMCC
TITLE: July 6, 1985 anolyte leak from storage tank.

REF.#: K169
DATE: 07/18/85
TO:
COMPANY: NDEP
FROM: R.B. Chase
COMPANY: KMCC
TITLE: RCRA ground water monitoring results.

REF.#: K170
DATE: 10/09/87
TO:
COMPANY: USEPA
FROM:
COMPANY: Jacobs Engineering
TITLE: Draft RCRA Facility Assessment of KMCC.

REF.#: K171
DATE: 11/11/88
TO:
COMPANY: KMCC
FROM:
COMPANY: State Industries
TITLE: EP Toxicity results on the solar evaporation pond at State Industries.

REF.#: K172
DATE: 04/27/89
TO: In-House
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: April 27, 1989 anolyte leak from a storage tank.

REF.#: K173
DATE: 09/01/73
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: September 1, 1989 anolyte leak from L1A tank.

REF.#: K174
DATE: 04/25/91
TO: Patrick S. Corbett
COMPANY: KMCC
FROM:
COMPANY: NDEP
TITLE: Consent Agreement. Phase I Environmental Conditions Assessment (Phase I ECA).

REF.#: K176
DATE: 01/10/91
TO: P.S. Corbett
COMPANY: KMCC
FROM: D.G. Elmer
COMPANY: KMCC
TITLE: Internal Correspondence - Breakdown of production and sales from 1951 through 1990.

REF.#: K178
DATE: 00/00/44
TO:
COMPANY: U.S. Government
FROM:
COMPANY: Basic Magnesium Inc.
TITLE: Storm Drain Map.

REF.#: K179
DATE: 03/15/90
TO: Paul La Courreye
COMPANY: USEPA
FROM: Peter R. Towle
COMPANY: Ecology and Environment, Inc.
TITLE: CERCLA Screening Site Inspection of KMCC, Henderson, Nevada.

REF.#: K180
DATE: 07/24/91
TO: Lorraine Bruce
COMPANY: Geraghty and Miller, Inc.
FROM: H. Starr Davis
COMPANY: Chemstar Lime
TITLE: Corporate names associated with Chemstar Lime's plant in the BMI Complex, Henderson, Nevada.

REF.#: K181
DATE: 06/28/91
TO:
COMPANY: KMCC
FROM:
COMPANY: Kleinfelder, Inc.
TITLE: Revised Work Plan for Preparation of a Phase I Environmental Conditions

Assessment of the Kerr-McGee Facility (BMI Complex), Henderson, Nevada.

REF.#: K182
DATE: 07/09/91
TO: P.S. Corbett
COMPANY: KMCC
FROM:
COMPANY: NDEP
TITLE: Approval of Revised Draft Work Plan for Phase I Environmental Conditions Assessment of the KMCC facility.

REF.#: K210
DATE: 11/08/83
TO: W. L. Johnson
COMPANY: KMCC
FROM: P. S. Corbett
COMPANY: KMCC
TITLE: Application for Expenditure - Replace Pond AP-1 and AP-3.

REF.#: K212
DATE: 08/06/84
TO: J. L. Rainey
COMPANY: KMCC
FROM: R. J. Vreeland
COMPANY: KMCC
TITLE: Application for Expenditure - new cooling tower for the ammonium perchlorate plant to provide cooling for the salt crystallizer.

REF.#: K214
DATE: 12/08/89
TO:
COMPANY: KMCC
FROM:
COMPANY: Tracker Services, Inc.
TITLE: Daily Operational Summary - De-watering A.P. Pond.

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REF.#: K219
DATE: 03/23/82
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: Application for Authorization for equipment which will provide for treatment of solid waste (Filter Cake) generated in the sodium chlorate recovery area, thereby rendering it "non-Hazardous" by EPA Standards.

REF.#: K220
DATE: 04/10/90
TO: W. F. Marseilles
COMPANY: KMCC
FROM: P. S. Corbett
COMPANY: KMCC
TITLE: Decommissioning Sodium Chlorate Pond P-2.

REF.#: K223
DATE: 08/30/84
TO: W. L. Johnson
COMPANY: KMCC
FROM: R. E. Huggins
COMPANY: KMCC
TITLE: Application For Expenditure - Reline Pond P-2.

REF.#: K249
DATE: 01/19/87
TO: W. F. Marseilles
COMPANY: KMCC
FROM: P. S. Corbett
COMPANY: KMCC
TITLE: Installation of Process spill Containment System in Unit 6 of the manganese dioxide plant.

REF.#: K253
DATE: 00/00/66
TO:
COMPANY: AP & CC
FROM:
COMPANY: AP & CC
TITLE: Henderson Plant Process General Description.

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REF.#: K255
DATE: 07/01/75
TO: James A. Maston - Donald R. Arkell
COMPANY: Air Pollution Control Division
FROM: C. B. Armstrong
COMPANY: KMCC
TITLE: Registration/Application for Operating Permit for magnesium perchlorate manufacture.

REF.#: K256
DATE: 09/19/84
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: Tumbleaf Defoliant.

REF.#: K257
DATE: 10/08/85
TO: R. F. Wohletz
COMPANY: KMCC
FROM: S. T. George
COMPANY: KMCC
TITLE: The production of Boron Trichloride.

REF.#: K258
DATE: 02/00/86
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: The production of Boron at KMCC, Henderson.

REF.#: K259
DATE: 06/00/91
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: Sodium Chlorate Process Flow Diagrams.

REF.#: K260
DATE: 02/20/91
TO: Dan Gross
COMPANY: NDEP
FROM: P. S. Corbett
COMPANY: KMCC
TITLE: 1990 PCB Inspection Data Sheets

REF.#: K261
DATE: 11/07/82
TO: Distribution
COMPANY: KMCC
FROM: J. H. Stallings
COMPANY: KMCC
TITLE: PCB's - use in electrical equipment - amendments to existing rules.

REF.#: K262
DATE: 02/22/91
TO:
COMPANY: Clark County Recorders Office
FROM:
COMPANY: AP & CC
TITLE: Rights of Way and Easements and Summary of Property Conveyances.

REF.#: K263
DATE: 08/28/91
TO:
COMPANY:
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: "Henderson, Nevada Leases".

REF.#: K264
DATE: 05/02/90
TO: Alan Gaddy
COMPANY: KMCC
FROM: Brent E. Stephens
COMPANY: Data Chem Laboratories
TITLE: EP Toxicity results of manganese tailings.

REF.#: K265
DATE: 06/28/71
TO: FILE
COMPANY: KMCC
FROM: R.F. Wohletz
COMPANY: KMCC
TITLE: Narrative on plant effluents.

REF.#: K266
DATE: 06/00/71
TO:
COMPANY: Department of the Army, Corps of Engineers
FROM: T.L. Hurst
COMPANY: KMCC
TITLE: "Application for permit to discharge or work in navigable waters and their tributaries".

REF.#: K268
DATE: 04/12/83
TO: Stephen H. Pia
COMPANY: KMCC
FROM: Gary Meke
COMPANY: U.S. Ecology
TITLE: "Chemical Waste Shipment Record Form, Straight Bill of Lading".

REF.#: K269
DATE: 00/00/75
TO:
COMPANY:
FROM:
COMPANY: KMCC
TITLE: Manganese dioxide plant - process flow diagram.

REF.#: K275
DATE: 06/09/70
TO: H.S. Curtis
COMPANY: AP & CC
FROM: J.E. Reynolds
COMPANY: AP & CC
TITLE: Inventory of air and water effluents (Pollution Inventory).

REF.#: K277
DATE: 03/09/70
TO: H.S. Curtis
COMPANY: AP & CC
FROM: R.F. Wohletz
COMPANY: AP & CC
TITLE: "Sources of Water Pollution From Chlorate Plant".

REF.#: K278
DATE: 03/06/70
TO: H.S. Curtis
COMPANY: AP & CC
FROM: J.E. Reynolds
COMPANY: AP & CC
TITLE: "Water Pollution Abatement Program".

REF.#: K281
DATE: 05/19/81
TO: Curtis Tidwell and Lee Span
COMPANY: State Industries
FROM: Randy Marcus and Gary Lavagnino
COMPANY: NDEP
TITLE: "EPA Region IX Facility Investigation Report".

REF.#: K282
DATE: 11/14/85
TO: Leonard Spann
COMPANY: State Industries
FROM: Alene Coulson
COMPANY: NDEP
TITLE: "Interim Status Standards (ISS), Treatment, Storage, or Disposal Facility, investigation Report, NAC 444.8850".

REF.#: K283
DATE: 01/15/87
TO: Alene Coulson
COMPANY: NDEP
FROM: Leonard Spann
COMPANY: State Industries.
TITLE: "NDEP Small Quantity Generator Investigation Report, (100-1000 Kg)".

REF.#: K286
DATE: 01/31/89
TO: Joe Livak
COMPANY: NDEP
FROM: Dave Chesmore
COMPANY:
TITLE: Record of Communication "Waste Water Pond Closure, State Industries, L.V."

REF.#: K289
DATE: 08/14/80
TO: Curtis Tidwell
COMPANY: State Industries
FROM: A. Han
COMPANY: State Industries
TITLE: Inter office correspondence - Hazardous waste compliance.

REF.#: K290
DATE: 11/03/80
TO: Bill Wilson
COMPANY: USEPA
FROM: Leonard Spann
COMPANY: State Industries
TITLE: Request to be removed as "treaters" of hazardous waste.

REF.#: K295
DATE: 06/14/73
TO: Glen Taylor
COMPANY: Basic Management Inc.
FROM: R.T. Whitney
COMPANY: Public Works
TITLE: Industrial waste discharges into the sewer system (City Plant No. 2).

REF.#: K297
DATE: 06/13/73
TO: Whitney
COMPANY: Public Works
FROM: Henry J. Greenville
COMPANY: USPHS (Ret), consulting, Sanitary and Biochemical Engineer
TITLE: Two separate discharges of industrial chemical waste occurred.

Unable to open <https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-369.jpg?projectId=34435&pageNumber=369&versionId=800101187&username=username&format=bw&enc=enc>.

Error:java.io.IOException:

Server returned HTTP response code: 500 for URL: https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-369.jpg?projectId=34435&pageNumber=369&versionId=800101187&username=username&format=bw&enc=enc

Error: Please make sure this file can be accessed and that it is a supported file type.

REF.#: K304
DATE: 09/09/86
TO: LaVerne Rosse
COMPANY: NDEP
FROM: Susan M. Crowley
COMPANY: KMCC
TITLE: Letter transmitting signed finalized Consent Order for clean-up of chromium in ground water at the Henderson Facility. (September 9, 1986 Consent Order - Chromium contaminated Ground Water Mitigation.)

REF.#: K305
DATE: 01/24/91
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP December 1990 Discharge Monitoring Report (DMR) - NPDES Permit No. NV0000078".

REF.#: K318
DATE: 03/09/90
TO: Brent E. Stephens
COMPANY: Data Chem Laboratories
FROM: Alan J. Gaddy
COMPANY: KMCC
TITLE: "Analytical Request Form" requesting analyses of iron oxide solids (Fe2O3) from ground water treatment unit and analytical results.

REF.#: K319
DATE: 06/05/90
TO: Alan J. Gaddy
COMPANY: KMCC
FROM: Brent E. Stephens
COMPANY: Data Chem Laboratories
TITLE: Analytical results - TCLP (8 metals) analyses for 1990 manganese tailings.

REF.#: K320
DATE: 01/19/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP December 1989 Discharge Monitoring Report, NPDES #NV0000078".

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REF.#: K321
DATE: 12/03/90
TO: Jim Robinson
COMPANY: National Response Center
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: "Spill Report #48954 - PCB Spill to Containment Area".

REF.#: K322
DATE: 10/19/79
TO: Juris Kanasezics
COMPANY: Atlas Foundry and Manufacturing Company
FROM: W.H. Voorheis
COMPANY: KMCC
TITLE: Cover letter and bill of lading for a carload of scrap graphite.

REF.#: K323
DATE: 11/15/78
TO: Juris Kanasezics
COMPANY: Atlas Foundry and Manufacturing Company
FROM: W.H. Voorheis
COMPANY: KMCC
TITLE: Cover letter and bill of lading for a carload of scrap graphite.

REF.#: K324
DATE: 04/14/76
TO: Juris Kanasezics
COMPANY: Atlas Foundry and Manufacturing Company
FROM: W.H. Voorheis
COMPANY: KMCC
TITLE: Cover letter and bill of lading for a carload of scrap graphite.

REF.#: K325
DATE: 11/03/81
TO: Tom Ireland
COMPANY: KMCC
FROM: W.H. Voorheis
COMPANY: KMCC
TITLE: Internal Correspondence - Shipping document and weight ticket covering a load of scrap carbon (chlorate) sold to Stan Brand Inc.

REF.#: K326
DATE: 11/26/85
TO: Joe Livak
COMPANY: NDEP
FROM: R.B. Chase, Jr.
COMPANY: KMCC
TITLE: "NPDES Permit NV 0000078". Discharge of cooling tower water to Beta ditch.

REF.#: K327
DATE: 12/27/85
TO: Joe Livak
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: "NPDES Permit NV 0000078". Cooling tower water discharge to the Beta ditch.

REF.#: K328
DATE: 12/13/85
TO: Joe Livak
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: Deleted, was second page to doc. #K327.

REF.#: K329
DATE: 12/30/85
TO: Joe Livak
COMPANY: NDEP
FROM: R.B. Chase, Jr.
COMPANY: KMCC
TITLE: "NPDES Permit NV 0000078". Cooling tower water discharge to the Beta ditch.

REF.#: K330
DATE: 01/06/86
TO: Joe Livak
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: "NPDES Permit NV 0000078". Discharge of cooling tower water into the Beta ditch.

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REF.#: K331
DATE: 02/20/86
TO: Joe Livak
COMPANY: NDEP
FROM: R.B. Chase, Jr.
COMPANY: KMCC
TITLE: "NPDES Permit NV 0000078". Cooling tower water discharge into the Beta ditch.

REF.#: K332
DATE: 03/31/86
TO: Susan Crowley
COMPANY: KMCC
FROM: Mark Small
COMPANY: Timet
TITLE: Summary of search for cause of high return to KMCC's cooling tower.

REF.#: K333
DATE: 01/06/86
TO: Susan Crowley
COMPANY: KMCC
FROM: Mark Small
COMPANY: Timet
TITLE: Report on 12/10/85, recirculated water line failure (cooling tower overflow).

REF.#: K334
DATE: 10/23/89
TO: W.M. Claeys
COMPANY: KMCC
FROM: K.A. Cimaglia
COMPANY: KMCC
TITLE: "Plant Water Balance, September, 1989".

REF.#: K335
DATE: 00/00/91
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: Listing of "dead files" where platinum shipment accounting information is stored.

REF.#: K336
DATE: 03/26/91
TO: Tom Ryan
COMPANY: PGP Industries
FROM:
COMPANY: KMCC
TITLE: "Material Shipping Order" for filter cake containing platinum from the sodium perchlorate process.

REF.#: K337
DATE: 04/01/91
TO:
COMPANY: PGP Industries, Inc.
FROM: Alan J. Gaddy
COMPANY: KMCC
TITLE: "Uniform Hazardous Waste Manifest".

REF.#: K338
DATE: 00/00/91
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: "Draft Steam Plant Training Manual"

REF.#: K339
DATE: 10/23/89
TO: Larry G. Christiansen
COMPANY: KMCC
FROM:
COMPANY: Espy Brothers Construction
TITLE: Contract and invoices for old main cooling tower demolition.

REF.#: K340
DATE: 08/16/91
TO: Larry G. Christiansen
COMPANY: KMCC
FROM:
COMPANY: Centennial Concrete
TITLE: Invoice for concrete removal from basement of Sub 50.

REF.#: K341
DATE: 08/28/91
TO: Larry G. Christiansen
COMPANY: KMCC
FROM:
COMPANY: Centennial Concrete
TITLE: Invoice for concrete removal from basement of Sub 50.

REF.#: K342
DATE: 11/23/88
TO:
COMPANY: KMCC
FROM: Lewis Dickson
COMPANY: Gundle
TITLE: "Pipe Test Certificate" for transfer piping system from tank(s) to ponds WC-1 and WC-2.

REF.#: K343
DATE: 05/15/85
TO: P.S. Corbett
COMPANY: KMCC
FROM: Allen Biaggi
COMPANY: NDEP
TITLE: "Solid Waste Landfill".

REF.#: K344
DATE: 07/10/91
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: "Hemcat - Alphabetic Stock Catalog".

REF.#: K345
DATE: 06/11/91
TO: Scott Shaw
COMPANY: Centennial Concrete
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: Construction related documents for new sodium chlorate filter cake holding area north of Unit 3.

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REF.#: K346
DATE: 01/11/91
TO: Ida R. Garces
COMPANY: Sierra Technical Services Corporation
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: Analytical request form (C-O-C) and analytical results - PCBs.

REF.#: K347
DATE: 01/12/76
TO: Gentlemen
COMPANY: NDEP
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: "NPDES Permit NV 0000078" - Letter reporting that KMCC has eliminated the discharge of process waste waters to the BMI ponds (zero discharge).

REF.#: K353
DATE: 11/13/87
TO:
COMPANY: KMCC
FROM: Brian Hammond
COMPANY: DataChem
TITLE: Analytical reports of soil samples taken in the vicinity of proposed SIs WC-1 and WC-2.

REF.#: K354
DATE: 00/00/90
TO:
COMPANY: KMCC
FROM:
COMPANY: KMCC
TITLE: Manifests, KMCC shipping documents, and US Ecology certificates of disposal for liner and solids for decommissioning of old P-2.

REF.#: K355
DATE: 11/14/91
TO: F.K. Downey
COMPANY: KMCC
FROM: J.H. Mashburn
COMPANY: KMCC
TITLE: Internal correspondence related to J.B. Kelley, Inc. - "Regulatory

Compliance Audit-KMCC Henderson, NV Lease, Jack B. Kelley, Inc."

REF.#: K356
DATE: 07/28/89
TO: P.S. Corbett
COMPANY: KMCC
FROM: A.J. Gaddy
COMPANY: KMCC
TITLE: Internal correspondence regarding 1,277 pound discharge of manganese dioxide to Henderson POTW in 1987.

REF.#: K357
DATE: 00/00/92
TO: Todd Croft
COMPANY: Kleinfelder
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: Personal Communications.

REF.#: K358
DATE: 00/00/91
TO: Todd Croft
COMPANY: Kleinfelder
FROM: John Colt
COMPANY: J.B. Kelley, Inc.
TITLE: Personal Communications.

REF.#: K359
DATE: 02/07/92
TO: P.B. Dizikes
COMPANY: KMCC
FROM: F.K. Downey
COMPANY: KMCC
TITLE: "Regulatory Compliance Audit-KMCC Henderson, NV Lease/Koch Materials".

REF.#: K361
DATE: 00/00/65
TO:
COMPANY:
FROM:
COMPANY: KMCC
TITLE: "Henderson Plant, Cost of Production - 53 Weeks 1965". Also "Henderson Plant, Cost of Production - 52 Weeks 1964".

REF.#: K366
DATE: 05/15/92
TO: Todd Croft
COMPANY: Kleinfelder, Inc.
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: Fax transmission - Hand written KMCC responses to NDEP questions concerning the Draft Phase I ECA Report.

REF.#: K371
DATE: 10/19/89
TO: Michael K. Stooker
COMPANY: U.S. Ecology
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: Uniform Hazardous Waste Manifest.

REF.#: K372
DATE: 02/06/79
TO:
COMPANY: CCHD, Air Pollution Control Board
FROM:
COMPANY: KMCC
TITLE: Operating permits for various air pollution control devices.

REF.#: K373
DATE: 04/22/91
TO:
COMPANY: U.S. Ecology
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: Uniform Waste Manifests #00449, 00450, and other supporting documents re: the removal and disposal of soil and concrete from the old chlorate drying pad (predates present SWMU-005).

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REF.#: N001
DATE: 10/14/54
TO:
COMPANY: Southern California Chemical Research Group
FROM: David R. Stern
COMPANY:
TITLE: The Electrochemical Industry, Henderson, NV.

REF.#: N007
DATE: 10/21/46
TO:
COMPANY: The General Public
FROM: A. J. Shaver
COMPANY: Colorado River Commission
TITLE: Electro-Chemical Operations at Henderson, Clark County, Nevada, October 1946.

REF.#: N008
DATE: 03/06/47
TO: General Public
COMPANY:
FROM:
COMPANY: Henderson Nevada Chamber of Commerce
TITLE: The New Basic Magnesium Project Story.

REF.#: N009
DATE: 00/00/47
TO: General Public
COMPANY:
FROM:
COMPANY: Office of Real Property Disposal, War Assets Administration
TITLE: Basic, Plancor 201, Chemical Processing, Allied and Other Industrial Enterprises, fact sheet/buyer guide.

REF.#: N011
DATE: 08/12/51
TO:
COMPANY:
FROM: A. J. Shaver
COMPANY: Colorado River Commission of Nevada
TITLE: 15 pages of questions and answers regarding Basic Magnesium Incorporated. Additionally, "Bill of Sale" to WECCO.

REF.#: ND001
DATE: 10/09/84
TO: Rolfe B. Chase Jr.
COMPANY: KMCC
FROM: Thomas J. Fronapfel
COMPANY: NDEP
TITLE: Deficiencies in H.W. Landfill closure/post-closure plan.

REF.#: ND002
DATE: 05/05/89
TO:
COMPANY: NDEP
FROM: Alan Gaddy
COMPANY: KMCC
TITLE: First Quarter Performance Report, Chromium Mitigation Program, Kerr-McGee Chemical Corporation, Henderson, Nevada, January-March, 1989.

REF.#: ND004
DATE: 06/19/80
TO: C. B. Armstrong
COMPANY: KMCC
FROM: Kenneth D. Greenberg
COMPANY: EPA
TITLE: NPDES Compliance Monitoring Report.

REF.#: ND006
DATE: 04/13/88
TO:
COMPANY: NDEP
FROM: Jeff Lux
COMPANY: KMCC
TITLE: First Quarter Performance Report, Chromium Mitigation Program, Kerr-McGee Chemical Corporation, Henderson, Nevada, April 13, 1988.

REF.#: ND009
DATE: 04/21/83
TO: Harry Van Drielen
COMPANY: NDEP
FROM: R. B. Chase
COMPANY: KMCC
TITLE: Response to questions regarding an anolyte leak which occurred on January

16, 1983.

REF.#: ND010
DATE: 07/26/88
TO:
COMPANY: NDEP
FROM: Jeff Lux
COMPANY: KMCC
TITLE: Second Quarter Performance Report, Chromium Mitigation Program, Kerr-McGee Chemical Corporation, Henderson, Nevada, July 26, 1988.

REF.#: ND039
DATE: 01/25/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: Fourth Quarter Performance Report, Chromium Mitigation Program, Kerr-McGee Chemical Corporation, Henderson, Nevada, October-December, 1989.

REF.#: ND048
DATE: 03/11/86
TO: Rolfe B. Chase
COMPANY: KMCC
FROM: Joseph S. Livak
COMPANY: NDEP
TITLE: Finding of Alleged Violation dated 8/11/86.

REF.#: ND049
DATE: 11/29/84
TO: Thomas J. Fronapfel
COMPANY: NDEP
FROM: R. B. Chase
COMPANY: KMCC
TITLE: KMCC Henderson Facility, Status Report - Groundwater Monitoring and Contaminate Mitigation Program.

REF.#: ND053
DATE: 06/18/82
TO:
COMPANY:
FROM: Steven H. Simanonok
COMPANY: USEPA
TITLE: List of owner/lessee/manufactures at BMI Complex; area geology, information

on surface water (upsets result in discharge reaching Alpha Ditch); air pollution; summary of on-site/off-site waste disposal.

REF.#: ND054
DATE: 12/13/90
TO:
COMPANY:
FROM:
COMPANY: NDEP
TITLE: "Briefing Book, environmental issues associated with the BMI complex".

REF.#: OT001
DATE: 00/00/88
TO: General Public
COMPANY:
FROM: K. Brother and T. Katzer
COMPANY: Las Vegas Valley Water District
TITLE: Ground Water Chemistry changes resulting from stressed aquifer system in Las Vegas Valley, Clark Co., Nevada.

REF.#: OT002
DATE: 00/00/48
TO: General Public
COMPANY:
FROM: G. B. Maxey
COMPANY: Nevada Department of Conservation and Natural Resources
TITLE: Geology and Water Resources of the Las Vegas, Pahrump and Indian Springs Valley, Clark and Nye Counties, Nevada.

REF.#: OT003
DATE: 00/00/81
TO:
COMPANY:
FROM: John W. Bell
COMPANY: Nevada Division of Mines and Geology
TITLE: Subsidence in Las Vegas Valley.

REF.#: OT004
DATE: 00/00/65
TO: General Public
COMPANY:
FROM: C. R. Longwell
COMPANY: Nevada Division of Mines and Geology
TITLE: Geology and Mineral Deposits of Clark County, Nevada.

REF.#: UB001
DATE: 09/00/89
TO:
COMPANY: U.S. Bureau of Reclamation
FROM:
COMPANY: U.S. Bureau of Reclamation
TITLE: Colorado River Basin Salinity Control Project Point Source Division, Las Vegas Wash Unit, Nevada, Final Report.

REF.#: UB003
DATE: 10/00/82
TO:
COMPANY: U.S. Bureau of Reclamation
FROM:
COMPANY: U.S. Bureau of Reclamation
TITLE: Colorado River Basin Salinity Control Project Point Source Division, Las Vegas Wash Unit, Nevada, Status Report.

REF.#: UB008
DATE: 10/00/82
TO:
COMPANY: U.S. Bureau of Reclamation
FROM:
COMPANY: U.S. Bureau of Reclamation
TITLE: Colorado River Basin Salinity Control Project Point Source Division, Las Vegas Wash Unit, Nevada, Status Report Index.

REF.#: UB015
DATE: 07/00/84
TO: Commissioner, Washington, D.C.
COMPANY: U.S. Bureau of Reclamation
FROM: Regional Director
COMPANY: U.S. Dept. of the Interior, Bureau of Reclamation
TITLE: Verification Plan Report, Pittman Verification program, Las Vegas Wash Unit, Nevada.

REF.#: UB018
DATE: 04/00/86
TO:
COMPANY: U.S. Bureau of Reclamation
FROM:
COMPANY: U.S. Bureau of Reclamation
TITLE: Las Vegas Wash Unit, Nevada, Program Management Document

REF.#: UE006
DATE: 03/12/90
TO:
COMPANY: USEPA
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "Notification of Hazardous Waste Activity"

REF.#: UE007
DATE: 05/07/90
TO: Elise Robertson
COMPANY: USEPA
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "Notification of Hazardous Waste Activity"

REF.#: UE016
DATE: 01/24/89
TO:
COMPANY: USEPA
FROM:
COMPANY: USEPA
TITLE: "Inspection Report, TSCA PCB Investigation"

REF.#: UE021
DATE: 02/06/90
TO: Tom Fronopfel
COMPANY: NDEP
FROM: P.S. Corbett
COMPANY: KMCC
TITLE: "1989 PCB Annual Report" and inspection data sheets covering the period 1/1/89 to 2/5/90. Also, copies of manifests used in the disposal and a Certificate of Disposal of PCB material.

REF.#: UE022
DATE: 07/24/87
TO: Thomas J. Fronapfel
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "KMCC Henderson Facility, EPA ID. No. NVD 008290330, Post Closure Permit Application, Hazardous Waste Landfill"

REF.#: UE024
DATE: 06/19/80
TO: C.B. Armstrong
COMPANY:
FROM: Kenneth D. Greenberg
COMPANY: USEPA
TITLE: "EPA, Region IX, Surveillance and Analysis Division, NPDES Compliance Monitoring Report"

REF.#: UE028
DATE: 00/00/86
TO:
COMPANY: EPA
FROM:
COMPANY: USEPA
TITLE: "Draft Fact Sheet"

REF.#: UE030
DATE: 08/14/74
TO: Richard L. O'Connell
COMPANY: USEPA
FROM: C.B. Armstrong
COMPANY: KMCC
TITLE: "Plan for monitoring Pond Leakage; Spill Prevention and Containment Plan".

REF.#: UE032
DATE: 09/13/89
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: Once through cooling water event with discharge through monitoring point 002.

REF.#: UE033
DATE: 10/19/89
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP September 1989 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE037
DATE: 02/27/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP January 1990 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE041
DATE: 07/24/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP June 1990 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE042
DATE: 08/27/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP July 1990 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE043
DATE: 09/26/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP August 1990 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE044
DATE: 10/26/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP September 1990 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE045
DATE: 11/27/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP October 1990 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE046
DATE: 12/17/90
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP November 1990 Discharge Monitoring Report - NPDES #NV0000078".

REF.#: UE047
DATE: 01/24/91
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP December 1990 Discharge Monitoring Report (DMR) - NPDES #NV0000078".

REF.#: UE048
DATE: 02/27/91
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP January 1991 Discharge Monitoring Report (DMR) - NPDES #NV0000078".

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REF.#: UE049
DATE: 03/27/91
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP February 1991 Discharge Monitoring Report (DMR) - NPDES #NV0000078".

REF.#: UE050
DATE: 04/25/91
TO: Joe Livak
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP March 1991 Discharge Monitoring Report (DMR) - NPDES #NV0000078".

REF.#: UE051
DATE: 05/21/91
TO:
COMPANY: NDEP
FROM:
COMPANY: KMCC
TITLE: Disposal amounts and flow analysis for DMR covering April 1991. Note: No cover sheet.

REF.#: UE052
DATE: 06/25/91
TO: Gentlemen
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP May 1991 Discharge Monitoring Report (DMR) - NPDES #NV0000078".

REF.#: UE053
DATE: 07/24/91
TO: Gentlemen
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP June 1991 Discharge Monitoring Report (DMR) - NPDES #NV0000078".

REF.#: UE054
DATE: 09/25/91
TO: Gentlemen
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "NDEP August 1991 Discharge Monitoring report (DMR) - NPDES #NV0000078".

REF.#: UE055
DATE: 10/28/91
TO: Gentlemen
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "September 1991 Discharge Monitoring Report (DMR), Henderson Facility - NPDES #NV0000078".

REF.#: UE056
DATE: 11/27/91
TO: Gentlemen
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "October 1991 Discharge Monitoring Report (DMR), Henderson Facility - NPDES #NV0000078".

REF.#: UE057
DATE: 12/18/91
TO: Gentlemen
COMPANY: NDEP
FROM: Patrick S. Corbett
COMPANY: KMCC
TITLE: "November 1991 Discharge Monitoring Report (DMR), Henderson Facility - NPDES #NV0000078".

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REF.#: UE059
DATE: 06/01/81
TO: Ken Greenburg
COMPANY: EPA
FROM: Eddy J. Forman
COMPANY: JRB Associates, Inc.
TITLE: "Henderson Industrial Complex, Hazardous Waste Investigation, U.S. EPA Contract 68-01-5052, Directive of Work #23".

REF.#: UE060
DATE: 00/00/82
TO:
COMPANY: EPA
FROM:
COMPANY: Timet
TITLE: BMI Complex Waste Water System

REF.#: UE061
DATE: 12/00/80
TO:
COMPANY:
FROM: Ken Greenberg
COMPANY: EPA
TITLE: Tables of waste and waste disposal for each BMI company, BMI dump, and BMI owned unlined ponds including City of Henderson.

REF.#: UE062
DATE: 00/00/83
TO:
COMPANY:
FROM:
COMPANY: EPA
TITLE: "Appendix B - Public Health Risk Assessment".

REF.#: UE063
DATE: 00/00/79
TO:
COMPANY: EPA
FROM:
COMPANY: EPA
TITLE: Hand written notes - Chromium and hexavalent chromium detected in storm water discharge from Stauffer.

REF.#: UE065
DATE: 05/17/92
TO: A.L. Anderson
COMPANY: KMCC
FROM: R.E. Harris
COMPANY: KMCC
TITLE: " Analysis of Henderson Plant EIMCO Tails for RCRA Leach Test".

REF.#: UE070
DATE: 03/25/80
TO: Curtis Tidwell
COMPANY: State Industries, Inc.
FROM: Clyde B. Eller
COMPANY: EPA
TITLE: EPA request to determine whether hazardous wastes have been or are being stored or transported on or off State Industries's property.

REF.#: UE071
DATE: 04/14/80
TO: Geoffrey Billingsley
COMPANY: City of Henderson
FROM: Curtis A. Tidwell
COMPANY: State Industries, Inc.
TITLE: Completed copy of the questionnaire of industrial waste inventory - RE: Raw material usage.

REF.#: UE072
DATE: 04/18/80
TO: Clyde B. Eller
COMPANY: EPA
FROM: Daniel D. Walker, Jr.
COMPANY: Flintkote Lime Company
TITLE: Response to EPA questions (letter dated 3/25/80) regarding operation, wastes and waste disposal.

REF.#: UE073
DATE: 04/23/80
TO: Clyde B. Eller
COMPANY: EPA
FROM: Glen C. Taylor
COMPANY: Basic Management, Inc.
TITLE: BMI response to March 25, 1980 EPA survey letter.

REF.#: UE074
DATE: 04/23/80
TO: Clyde B. Eller
COMPANY: EPA
FROM: Adolf Han
COMPANY: State Industries, Inc.
TITLE: State Industries response to March 25, 1980 EPA survey letter.

REF.#: UE075
DATE: 05/15/80
TO: Marvin Tabeau
COMPANY: NDEP
FROM: Jon Meckle
COMPANY: EPA
TITLE: Hand written notes - KMCC is repairing 2 ponds, State Stove has informed DEP of a ripped pond lining, and Stauffer is having problems sealing the LG032 well.

REF.#: UE076
DATE: 06/18/80
TO: Hal Wurzer
COMPANY: Montrose Chemical Company
FROM: Kenneth D. Greenberg
COMPANY: EPA
TITLE: "Environmental Protection Agency, Region IX, Surveillance and Analysis Division, NPDES Compliance Monitoring Report - Stauffer Chemical Company".

REF.#: UE078
DATE: 08/05/80
TO: Clyde Eller
COMPANY: EPA
FROM: G. R. Stewart
COMPANY: Stauffer Chemical Company
TITLE: Response to EPA letter dated August 21, 1980.

Rev.3.0
FINAL

REF.#: UE079
DATE: 08/08/80
TO: Bill Wilson
COMPANY: EPA
FROM: Glen C. Taylor
COMPANY: Basic Management, Inc.
TITLE: "Notification of Hazardous Waste Activities" - The disposal site (dump) was closed and debris covered by February, 1980.

REF.#: UE080
DATE: 09/03/80
TO: Clyde B. Eller
COMPANY: EPA
FROM: Glen C. Taylor
COMPANY: Basic Management, Inc.
TITLE: Response to EPA letter dated August 21, 1980.

REF.#: UE083
DATE: 01/00/81
TO:
COMPANY: Basic Management, Inc.
FROM:
COMPANY: EPA
TITLE: "Case Development Plan, Basic Management Incorporated Industrial Complex, Henderson, Nevada".

REF.#: UE085
DATE: 06/01/81
TO:
COMPANY: EPA
FROM:
COMPANY: BMI
TITLE: "Notification of Hazardous Waste Site".

REF.#: UE086
DATE: 06/01/81
TO:
COMPANY: EPA
FROM: Glen C. Taylor
COMPANY: Basic Management, Inc.
TITLE: "Notification of Hazardous Waste Site".

Rev.3.0
FINAL

REF.#: UE088
DATE: 06/04/81
TO:
COMPANY: EPA
FROM: Charles B. Armstrong
COMPANY: KMCC
TITLE: "Notification of Hazardous Waste Site"

REF.#: UE091
DATE: 00/00/76
TO:
COMPANY: EPA
FROM:
COMPANY: Stauffer
TITLE: Stauffer achieved zero discharge by April 1, 1976.

REF.#: UE097
DATE: 01/27/82
TO: Helmut Ogris
COMPANY: U.S. Homes, LV
FROM: David Moser
COMPANY: EPA
TITLE: "Sampling Pipe at Old BMI Ponds".

REF.#: UE098
DATE: 01/28/82
TO: Art Tuma
COMPANY: U.S. Bureau of Reclamation
FROM: David Moser
COMPANY: EPA
TITLE: "Telephone Conversation Report" - The 4 inch pipe mentioned in doc. # UE097 is used by the U.S. Bureau of Reclamation for an evaporation study.

REF.#: UE099
DATE: 02/01/82
TO: Jon Meckle
COMPANY: EPA
FROM: Vince Marci
COMPANY: Ecology & Environment
TITLE: "BMI Sampling".

REF.#: UE102
DATE: 03/18/82
TO: Charles Armstrong
COMPANY: KMCC
FROM:
COMPANY: Clark County Health District
TITLE: Data on ammonia sources.

REF.#: UE103
DATE: 03/23/82
TO: Marvin Tebeau
COMPANY: NDEP
FROM: Leonard L. Spann
COMPANY: State Industries, Inc.
TITLE: Report on State Industries liquid waste disposal program from 1970 to present.

REF.#: UE104
DATE: 03/26/82
TO: Gentlemen
COMPANY: NDEP
FROM: James V. Wiseman
COMPANY: Stauffer Chemical Company
TITLE: "Henderson Groundwater Investigation" - Stauffer response to NDEP Order of February 25, 1982.

REF.#: UE107
DATE: 03/31/82
TO: L.H. Dodgion
COMPANY: EPA
FROM: Glen C. Taylor
COMPANY: Basic Management, Inc.
TITLE: BMI response to February 25, 1982 NDEP Order - description of waste disposal.

REF.#: UE108
DATE: 04/00/82
TO: Lew Dodgion
COMPANY: NDEP
FROM:
COMPANY: Waste Management Staff
TITLE: "Summary of BMI Complex Responses to Order Issued February 25, 1982".

REF.#: UE114
DATE: 05/18/83
TO: H. LaVerne Rosse
COMPANY: NDEP
FROM: Leonard L. Spann
COMPANY: State Industries, Inc.
TITLE: State Industries response to NDEP for waste information RE: Cyanide and BMI dump use by State Industries.

REF.#: UE131
DATE: 07/06/83
TO: R.B. Chase, Jr.
COMPANY: KMCC
FROM: William D. Wilson
COMPANY: EPA
TITLE: "Henderson Facility [(EPA ID # NVD008298330) not able to completely read)]" - "not required to submit Part B permit application as requested 01/28/83" for surface impoundments and landfill.

REF.#: UE143
DATE: 07/18/84
TO: File
COMPANY: EPA
FROM: G. Upson
COMPANY: EPA
TITLE: "Contact Report" - Hand written notes regarding description of the three Henderson WWTP and dates of operation.

REF.#: UE146
DATE: 05/10/85
TO: Robert M. Mandel
COMPANY: EPA
FROM: Geoffrey Upson
COMPANY: Ecology and Environment, Inc.
TITLE: "Phase IIB Sampling Plan, Stauffer Chemical Company, BMI Complex, Henderson, Nevada".

Rev.3.0
FINAL

REF.#: UL001
DATE: 12/00/71
TO:
COMPANY: UNLV
FROM: Maryellen V. Saddovich
COMPANY: Student - UNLV
TITLE: Basic Magnesium, Incorporated and the Industrialization of Southern Nevada During World War II - Masters Thesis.

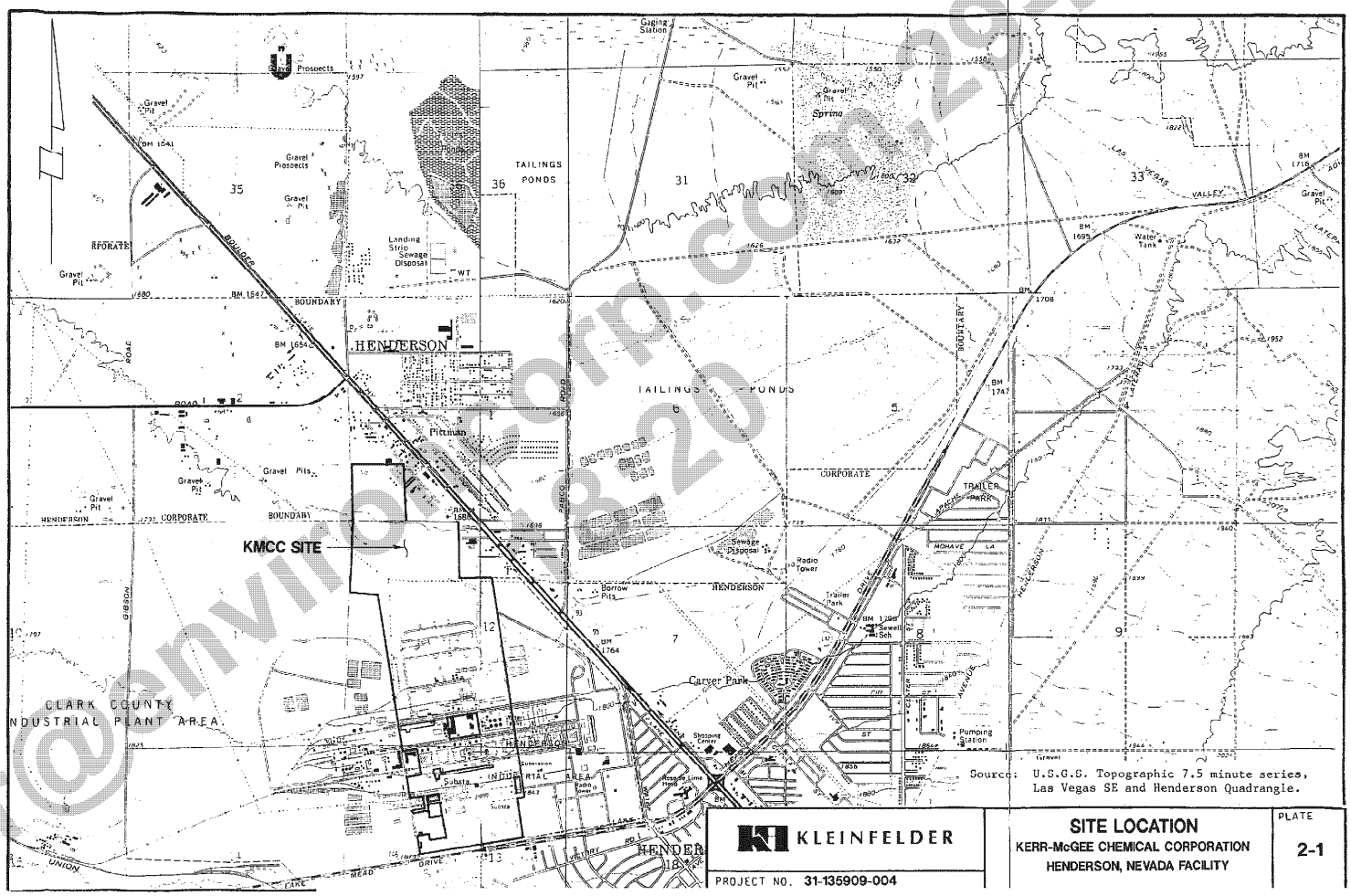
REF.#: UL002
DATE: 01/15/48
TO: General Public
COMPANY:
FROM:
COMPANY: UNLV Library (Henderson Shopping News)
TITLE: Full details of operations At Basic Told in expert's report.

REF.#: UL012
DATE: 10/00/43
TO: General Public
COMPANY:
FROM: Robert H. Ramsey
COMPANY: Chemical and Metallurgical Engineering
TITLE: Magnesium Production at the World's Largest Plant.

REF.#: UL013
DATE: 01/00/43
TO: General Public
COMPANY:
FROM:
COMPANY: The Flow Line
TITLE: Nevada's Light Metal Thunderbolt and Desert Giant Produces Hell for Hitler.

REF.#: UL020
DATE: 04/30/45
TO: F. O. Chase
COMPANY: Basic Magnesium Incorporated
FROM: Roy E. Thomas
COMPANY: Basic Magnesium Incorporated
TITLE: Factual History of engineering, Basic Magnesium, Incorporated, Defense Plant Corporation, Plancors 201 & 201 - H, Henderson and Gibbs, Nevada.

APPENDIX B
PLATES



KLEINFELDER

PROJECT NO. 31-135909-004

SITE LOCATION
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY

PLATE 2-1

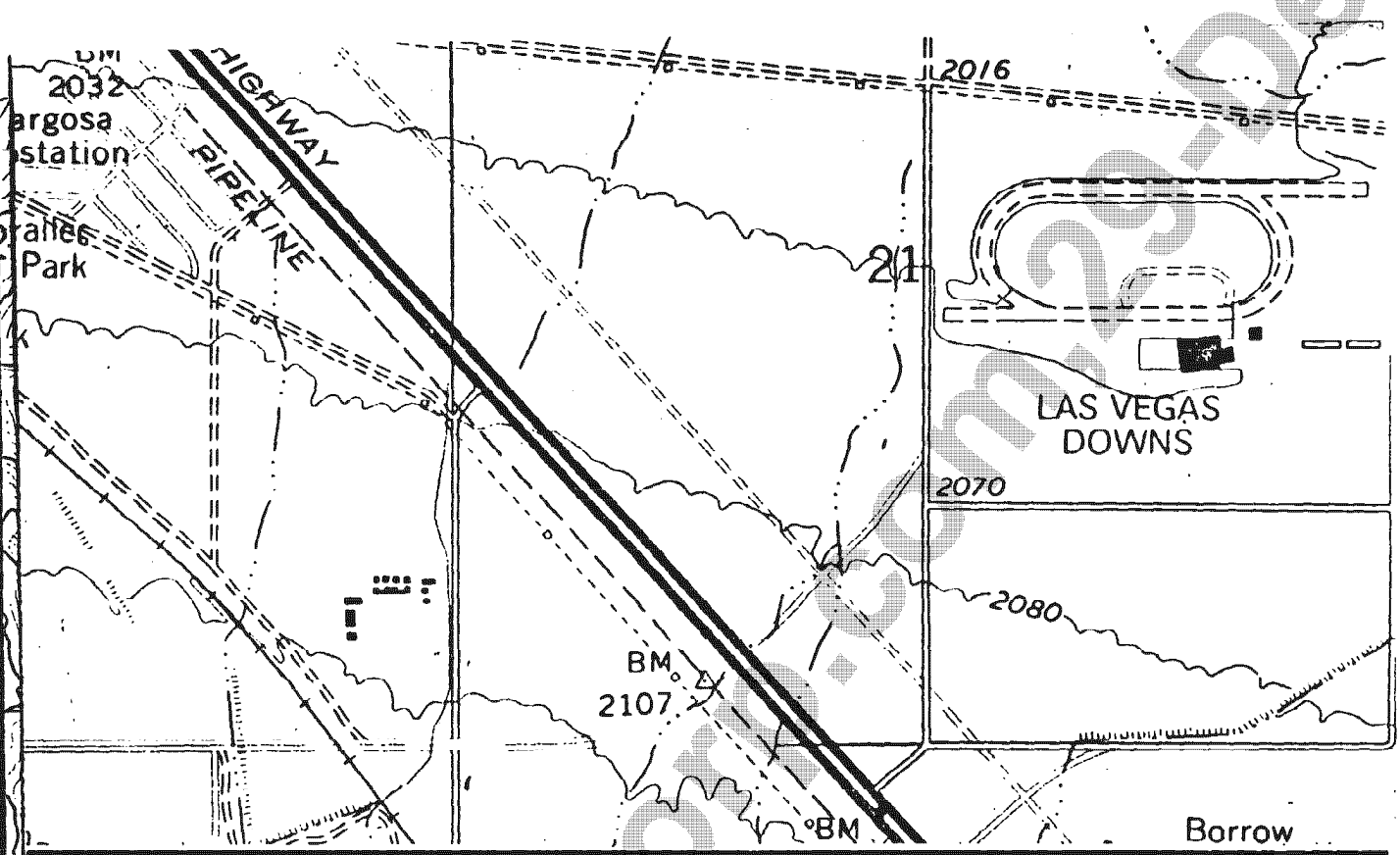


PLATE 3-1
BMI COMPLEX AREA

MODIFIED AFTER MAP PROVIDED BY GERAGHTY & MILLER, INC.

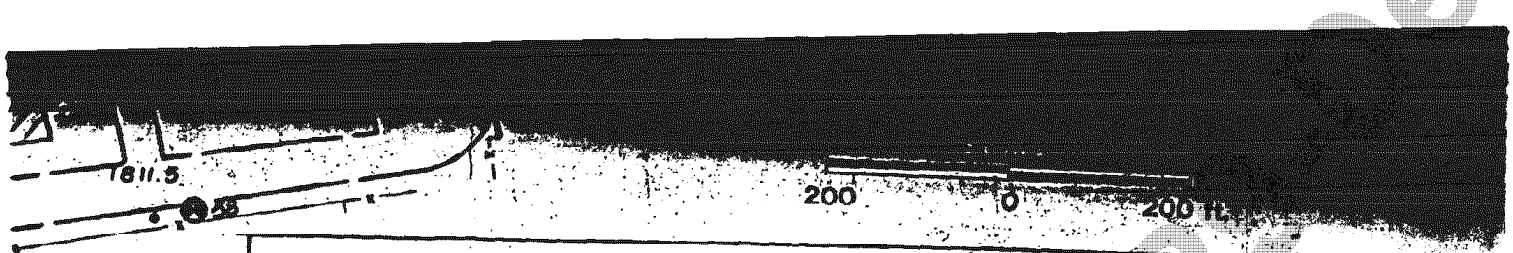
N

000 ft.

NV08501	REVISIONS 1.0
DATE 4-15-93	(FINAL)

GERAGHTY & MILLER, INC.
Ground Water Consultants
5270 Neil Road, Suite 101 Reno, Nevada 89502

57'30" 685 (BOULDER C
3055-IV



EXPLANATION :

INDICATES STREET LIGHT

INDICATES RETAINING WALL

INDICATES PHOTO CENTER

INDICATES FENCE

INDICATES GUARD RAIL

INDICATES WATER

INDICATES DIRT ROAD

INDICATES PAVED ROAD

INDICATES CURB AND GUTTER

⊗ SYMBOL INDICATES GAS SHUTOFF VALVE

INDICATES FIRE HYDRANT

INDICATES WATER CANNON

INDICATES POWER POLE

INDICATES CULVERT HEAD

INDICATES TREE

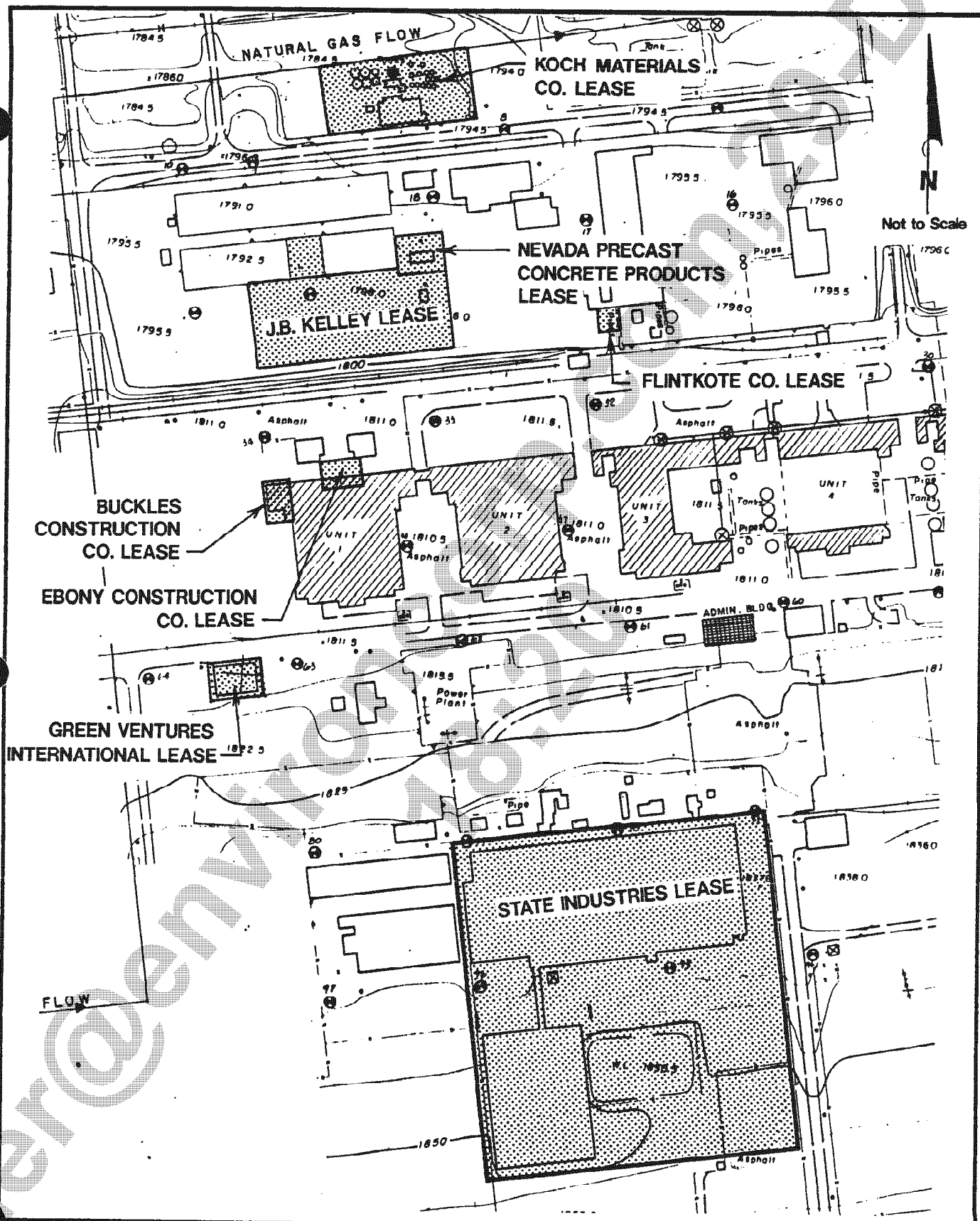
INDICATES BRUSH

△ INDICATES HORIZ. VERT. CONTROL

INDICATES PROPERTY LINE

PLATE 3-2

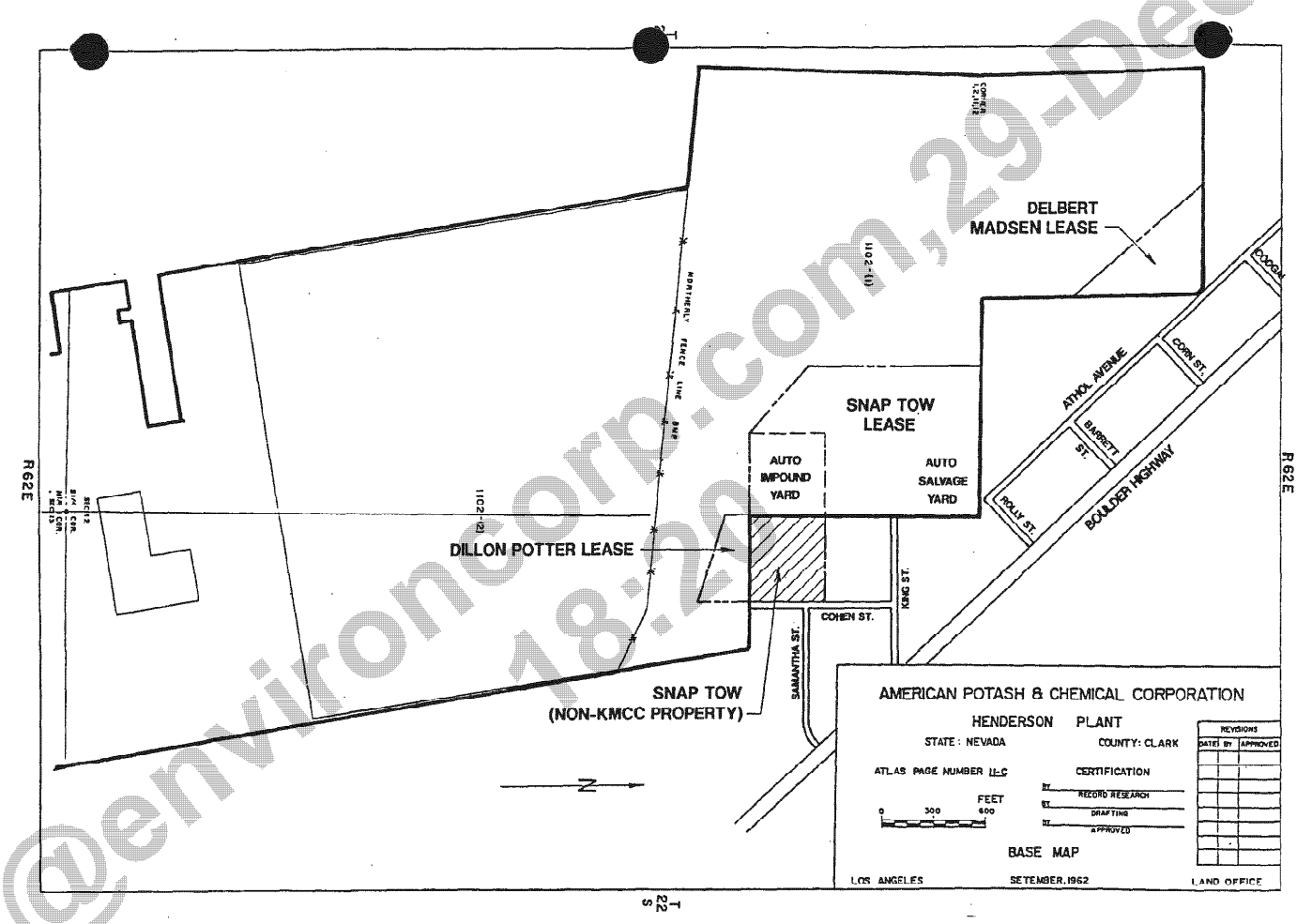
SITE PLAN



KLEINFELDER

KMCC TENANTS
SOUTHERN PORTION OF

PLATE
7-1



Modified after AP & CC 1962 Base Map provided by KMCC.

Reference: Landiscor Aerial Photo, #G-16, June 15, 1991

KLEINFELD

KMCC TENANTS - NORTHERN

PLATE

M-16

KMC DR
04-0008806

APPENDIX C

INDEX OF WASTES

Table C-1 is an index of wastes. This table reflects wastes generated from production of chlorates, perchlorates, manganese dioxide, and boron compounds. The combined wastes generated by WECCO, AP & CC, and KMCC between 1945 and 1991 are included. This index was generated from a review of documents and personal communications with the KMCC Environmental Engineer. Information is presented (when available) for the following categories:

- Wastes generated;
- Disposal location of wastes;
- Time frame disposal methods were used; and
- Estimated quantity of waste disposed of during the time frame.

TABLE C-1 INDEX OF WASTES

Process	Generated	Disposal	Date	Quantity	References
CHLORATES					
Sodium Chlorate	Sodium Chlorate filter cake and filter slurry or cakes containing diatomaceous earth, hexavalent and trivalent chromium, and other impurities	Unlined BMI ponds via Beta Ditch	1945-1974	391,000 ft^3	K037, K056, K253
		Disposed at BMI landfill	1975-1980(1)	90,000 ft^3	K003, K013, K037, K056, UE030
		On-site disposal at HW landfill	1980-1983	3,000 yd^3	K056, K095, K108, K128, K130, K138
		Off-site disposal at U.S. Ecology, Inc., Beatty, Nevada Facility	1983-Present(2)	NR/NC	K095, K286
	Liquid Wastes	Lined KMCC Pond P-1 Lined KMCC Pond S-1	1972-1983(3) 1974-1982(3)	NR/NC	K031, K037, K117, K158A, K161, K170
	Liquids	Recycle to process	1979- Present(3)	NR/NC	K037, K056
Potassium Chlorate	Filter cake and process liquid slurry (mother liquor)	Unlined BMI ponds via Beta Ditch	1945-1974(3)	ND	K037, K039, K056, K176
		Lined KMCC Pond P-1 Lined KMCC Pond S-1	1972-1983(3) 1974-1982(3)	NR/NC	K031, K037, K039, K056, K095, K105, K130, K176

TABLE C-1 INDEX OF WASTES

Process	Generated	Disposal	Date	Quantity	References
PERCHLORATES					
Sodium Perchlorate	Filter cake with and cell bottoms with recoverable platinum values	By-product material manifested as "recyclable material" and shipped off-site to metal recovery process	1964-Present	NR/NC	K335, K336, K357, K361, K366 UE006, UE007
	Liquid Wastes	Unlined BMI ponds via Beta Ditch	1951-1976	ND	K037, K039, K056, K176 K277, K347
	Liquid Wastes	Lined KMCC Pond P-1 Lined KMCC Pond S-1	1972-1983 1974-1983	NR/NC	K037, K039, K095 K124, K347, UE024, UE030
	Liquids	Recycled to process	1983-Present	NR/NC	K158A, K357
Potassium Percholorate	Filter slurry, mother liquor, or cakes containing diatomaceous earth, NaCl, KCl, $KClO_3$, $KClO_4$ $NaClO_4$, Na_2CO_3, $CaCO_3$, Cr	Unlined BMI ponds via Beta Ditch Lined KMCC Pond P-1 Lined KMCC Pond P-1 Lined KMCC Pond S-1	1945-1976 1972-1982 1972-1983(3) 1974-1982(3)	293,756 tons NR/NC	K037, K039, K056, K083 K278 K003, K013, K037, K039, K105, K347, UE024, UE030
Magnesium Perchlorate	Liquid waste	Unlined BMI ponds via Beta Ditch Lined KMCC Ponds S-1 & P-1	1969-1976 1972/1974(3) to 1976	ND ND	K037, K039, K056, K347 K003, K013, K037, K039, K105, K176, K255, K347, UE024, UE030

TABLE C-1 INDEX OF WASTES

Process	Generated	Disposal	Date	Quantity	References
Ammonium Perchlorate	Filter slurry or cakes containing diatomateous earth; and $CaCO_3$, $CaSO_4$, and $MgSO_4$, $Cr(OH)_3$	Unlined BMI ponds via Beta Ditch	1951-1974	ND	K003, K013, K031, K039, K158A, K278, K347, UE030
		Lined KMCC Ponds AP-1 through AP-5 as storage for recycle to process	1974-Present	NR/NC	K158A, UE024, UE030
		Dried residue from Lined KMCC Pond AP-2 disposed of at BMI landfill	Pre-1980	50 tons	K037, K039, UE083, UE146
		Dried residues from Lined KMCC Ponds AP-1, AP-2, and AP-3 disposed off-site at U.S. Ecology, Inc. Beatty, Nevada	1989-Present	NR/NC	K305, K320, K371
	Caustic scrubber solution (NaOH)	Unlined BMI ponds via Beta Ditch	Pre-1974	ND	K253
		Lined KMCC Old Pond P-2	1972-1990(3)	ND	K220, K003, UE024
		Lined KMCC New Pond P-2 or directly to Unit 3 (sodium chlorate process area)	1990-Present	ND	K357
	Overflow from AP cooling tower	Unlined BMI ponds via Beta Ditch	Pre-1974	ND	K357
		Lined KMCC Ponds AP-1 through AP-5	1974-Present	ND	K357
	Soils impacted by firewater (1990)	Off-site disposal at U.S. Ecology, Inc., Beatty, Nevada	1990	NR/NC	K158B

TABLE C-1 INDEX OF WASTES (Continued)

Process	Generated	Disposal	Date	Quantity	References
Cyclone Dust (Rotoclone)	Particulate emissions from central devices are below levels of concern.	Dissolved in water bath emission control devices and recycled to process.	1951-Present	NR/NC	K278
MANGANESE					
Manganese Dioxide	Manganese tailings-solids (Heavy metal sulfides)	Slurried in liquid and sluiced to on-site unlined leach beds	1951-1975	896,000 ft^3	K037, K039, K056, K164, K253
		Placed as a moist cake in on-site nonhazardous tailings area	1975-Present(3)	NR/NC	K003, K013, K037, K039, K056, K164, K253, UE030
	Manganese tailings-liquids	Leach beds on KMCC property	1951-1975	330,000,000 gallons	K037, K039, K056, K164, K253
		Recycled to process	1975-Present	NR/NC	K253
	Manganese dioxide product washwater (manganese dioxide)	City of Henderson POTW via sanitary sewer	Pre-1989	ND	K356
		Lined KMCC Ponds WC-1 and/or WC-2	1989-Present	NR/NC	K356, K357
	Calcine belt filter washwater (potassium, potassium phosphate, manganese, and other trace constituents	Lined KMCC Pond MN-1	1983-1989	NR/NC	K117, K253, K334

TABLE C-1 INDEX OF WASTES (Continued)

Process	Generated	Disposal	Date	Quantity	References
	Manganese dioxide cathode wash solution (sodium hexametaphosphate, water, calcium, magnesium, manganese from cathode scale, and tank mud)	Lined KMCC Ponds C-1 and MN-1	1975-Present	5,000 gallons once or twice a week	K117, K158A, K269, K347, ND004
		Lined KMCC Pond MN-1	1989-Present	infrequent	K357
	Barium Sulfide	Off-site disposal at U.S. Ecology, Inc., Beatty, Nevada Facility	Pre-1980	709 ft^3 drummed	K037, K253, K275
	Scrap and spent graphite anodes (carbon)	Sold to steel mills and foundaries	1960-1981	NR/NC	K322, K323, K324
	Soils impacted by anolyte/sulfuric acid spills/leaks	Manganese tailings pile	1980 (6)-Present	NR/NC	K070, K070A, K104A, K140A, K146A, K146C, K168, K172, K173, K170, ND009

TABLE C-1 INDEX OF WASTES (Continued)

Process	Generated	Disposal	Date	Quantity	References
BORON					
Elemental Boron	Boron process neutralization tank waste solution (contains sodium carbonate, magnesium sulfate, sodium borate, and sodium sulfate)(5)	Unlined BMI ponds via Beta Ditch	1972-1976	1,000,000 gallons	K031, K037, K039, K056, K083, K117, K170, K179, K257, K258, K347
		Lined KMCC Ponds S-1 & P-1	1976-1983	1,125,000+ gallons through July 1983	K031, K037, K038, K056 K083, K117, K170, K179 K257, K258, K347
		Lined KMCC Pond C-1	1975-Present	NR/NC	K158A, CA017
Boron Trichloride and Boron Tribromide	Spent Carbon Residue	BMI landfill	1972-1979	100,000 pounds	K039, K056, K117
		Nonhazardous disposal (local sanitary landfill).	1979-Present	NR/NC	K039, K117
	Cooling Tower Blowdown (Unit 5) and Reboiler Waste	Unlined BMI ponds via Beta Ditch Lined KMCC Ponds S-1 & P-1 Lined KMCC Pond C-1	1972-1976 1976-1983 1983-Present	NR/NC	K039, K056, K117, K170, K179, K257, K347
	Halide Wall Solid and Screen Filter Waste	Unlined BMI ponds via Beta Ditch Lined KMCC Ponds P-1,S-1 Lined KMCC Pond C-1	1972-1976 1976-1983 1983-1990	NR/NC ND ND	K039, K056, K117, K170, K179, K257, K347
	Wet scrubber liquid waste	Unit 5 cooling tower	1972-Present	NR/NC	K170, K179, K257, K357

TABLE C-1 INDEX OF WASTES (Continued)

Process	Generated	Disposal	Date	Quantity	References
OTHER					
	Plant Blowdown Effluent (wet) scrubber liquid waste stream) from boilers and cooling towers. Contains sodium hexametaphosphate neutralized sulfuric acid, and high boiling point compounds)	Unlined BMI ponds via Beta Ditch	1972-1974	ND	K039, K046, K117, K170, K179, K347
		Lined KMCC Ponds S-1, P-1	1974-1982	NR/NC	K039, K056, K117, K170, K179, K347
		Lined KMCC Pond C-1	1975-Present		
Groundwater Treatment Unit	Iron oxide sludge	Off-site disposal at U.S. Ecology, Beatty, Nevada Facility	1987-Present	NR/NC	K318, K357
PCB	PCB contaminated solids	Off-site disposal at U.S. Ecology, Beatty, Nevada Facility	Pre-1980	144 ft^3 drummed	K037, K260, K261, K321, K346
Old Main Cooling Tower	Old Main Cooling tower effluent,leaks, spills	Unlined BMI Ponds via Beta Ditch	Pre-1976	ND	K034, K158A, UB001, UB018
	Old Main Cooling Tower Effluent	Discharged to Lined KMCC Ponds C-1 (for evaporation) or WC-1/WC-2 as storage for recycle back to process	1976-1989	NR/NC	K038, K158A, ND048
	Old Main Cooling Tower Upsets	Las Vegas Wash via Beta Ditch and the Alpha ditch or Pittman by-pass pipeline	1976-1989	NR/NC	K034, K326, K327, K328, K329, K330, K331, K332, K333, K339,K146A, K146C, K158A, N009, N011, UB001, UB018

TABLE C-1 INDEX OF WASTES (Continued)

Process	Generated	Disposal	Date	Quantity	References
	Non-contact Cooling Water	Discharged to Las Vegas Wash via the Beta Ditch and to the Alpha Ditch or Pittman by-pass pipeline	1945-Present	up to 4 million gallons per day during summer	K037, K158A
Steam Plant	Wastewater (with concentrated dissolved solids)	Unlined BMI ponds via Beta Ditch	1945-1976	NR/NC	K037, K158A, K338
		Lined KMCC Pond C-1	1974-1989	NR/NC	K031, K117, K158A
		Wastewater Treatment Plant	1989-Present	NR/NC	K031, K117, K158A
Waste Water Treatment Plant (Vapor Recompression Units)		Lined KMCC Ponds WC-1 & WC-2	1989-Present	NR/NC	K158A, K305, K320

Notes:

(1) Sodium chlorate filter cakes (moist cakes) replaced previous slurry due to process changes which were completed by February 1975.

(2) Since January 1990, sodium chlorate filter cakes do not contain carbon as a result of process changes.

(3) Intential off-site disposal reportedly ceased by January 1976 (K347). The completion of various SIs occurred from approximately Spring 1972 through Fall 1975. Various production and waste stream changes and adjustments occurred during this phase-out period. Therefore, dates of SI startups and BMI pond disposal cessation are approximate only.

(4) Manganese dioxide tailings consist of damp filter cake since completion of process modifications in 1975.

(5) Prior to enactment of RCRA, documentation of discharge pH may not have occurred. Following RCRA enactment, pH of discharge is documented.

(6) No prior information or documented releases.

NR/NC - Quantity not researched/not calculated by Kleinfelder.

ND - Quantity not documented by KMCC or others.

APPENDIX D
LISTS

APPENDIX D

INDEX OF SWMUs AND AREAS OF KNOWN OR SUSPECTED RELEASES OR SPILLS

Appendix D contains the following information:

1. Index of KMCC Solid Waste Management Units (SWMUs); and
2. Index of Known or Suspected KMCC Releases or Spills.

The Index of KMCC SWMUs lists the following information:

- The report section that addresses each SWMU;
- The SWMU number; and
- The SWMU name.

The Index of Known or Suspected KMCC Releases or Spills lists the following information:

- The report section that addresses the release or spill; and
- The spill/release designation.

APPENDIX D

INDEX OF KMCC SWMUs

Section	SWMU Number	SWMU Name
5.1	KMCC-001 (MAP 1)	- "Process Hardware" Storage Area Between Units 1 and 2
5.2	KMCC-002 (MAP 2)	- Trash Storage Area North of Units 1 and 2
5.3	KMCC-003 (MAP 3)	- PCB Storage Area - Unit 2
5.4	KMCC-004 (MAP 4)	- Hazardous Waste Storage Area North of Unit 2
5.5	KMCC-005 (MAP 5)	- Sodium Chlorate Filter Cake Holding Area North of Unit 3
5.6	KMCC-006 (MAP 6)	- Hazardous Waste Storage Area Between Units 3 and 4
5.7	KMCC-007 (MAP 7)	- Platinum Drying Unit North of Unit 4
5.8	KMCC-008 (MAP 8)	- Solid Waste Dumpsters
5.9	KMCC-009 (MAP 9)	- Manganese Tailings Area
5.10	KMCC-010 (MAP 10)	- Old P-2 Surface Impoundment
5.11	KMCC-011 (MAP 11)	- C-1 Surface Impoundment
5.12	KMCC-012 (MAP 12)	- Mn-1 Surface Impoundment
5.13	KMCC-013 (MAP 13)	- Hazardous Waste Landfill (Closed)
5.14	KMCC-014 (MAP 14)	- Trade Effluent Settling Ponds (U.S. Government Operations)
5.15	KMCC-015 (MAP 15)	- WC-1 (WC-West) Surface Impoundment
5.16	KMCC-016 (MAP 16)	- WC-2 (WC-East) Surface Impoundment
5.17	KMCC-017 (MAP 17)	- Ammonium Perchlorate (AP) Area - Pad 35
5.18	KMCC-018 (MAP 18)	- Drum Crushing Area
5.19	KMCC-019 (MAP 19)	- Groundwater Remediation Unit
5.20	KMCC-020 (MAP 20)	- The Beta Ditch
5.21	KMCC-021 (MAP 21)	- Sodium Perchlorate Platinum By-Product Filter - Unit 5
5.22	KMCC-022 (MAP 22)	- Former Manganese Tailings Area

APPENDIX D

INDEX OF KMCC SWMUs (Continued)

APPENDIX D

INDEX OF KNOWN OR SUSPECTED KMCC RELEASES OR SPILLS

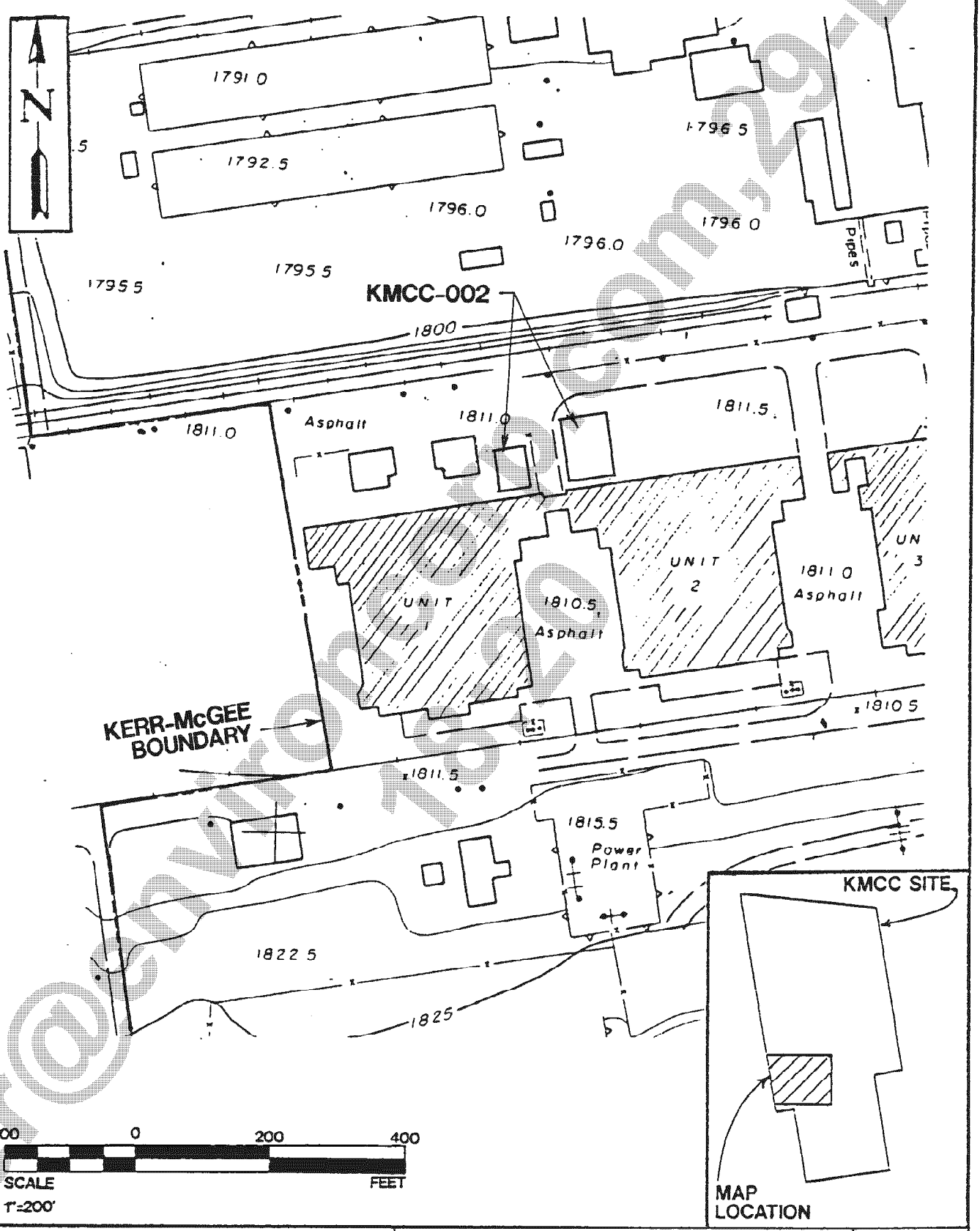
APPENDIX E
MAPS

Unable to open <https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-420.jpg?projectId=34435&pageNumber=420&versionId=800101187&username=username&format=bw&enc=enc>.

Error:java.io.IOException:

Server returned HTTP response code: 500 for URL: https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-420.jpg?projectId=34435&pageNumber=420&versionId=800101187&username=username&format=bw&enc=enc

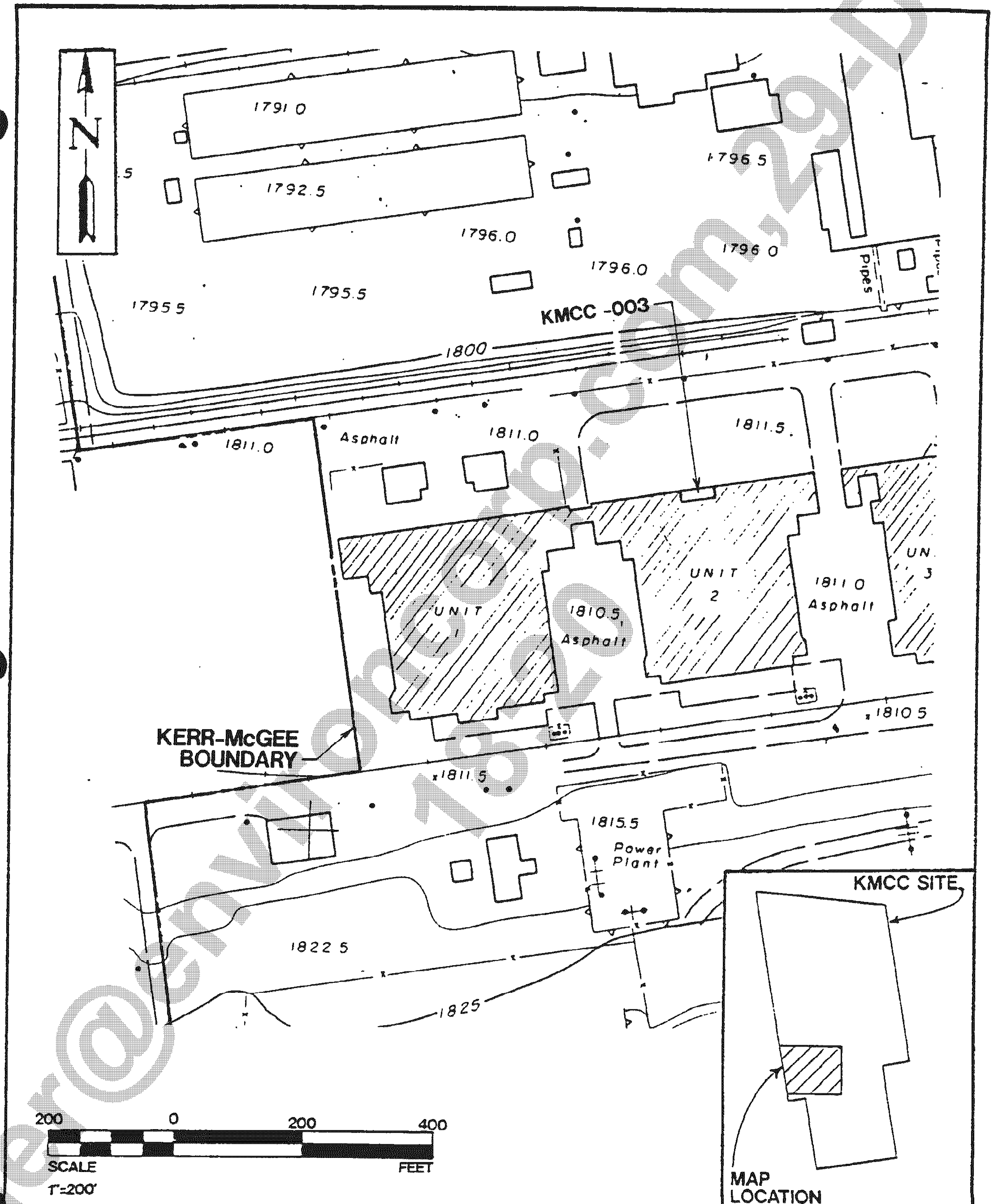
Error: Please make sure this file can be accessed and that it is a supported file type.



KLEINFELDER

MAP 2: KMCC-002 TRASH STORAGE AREA

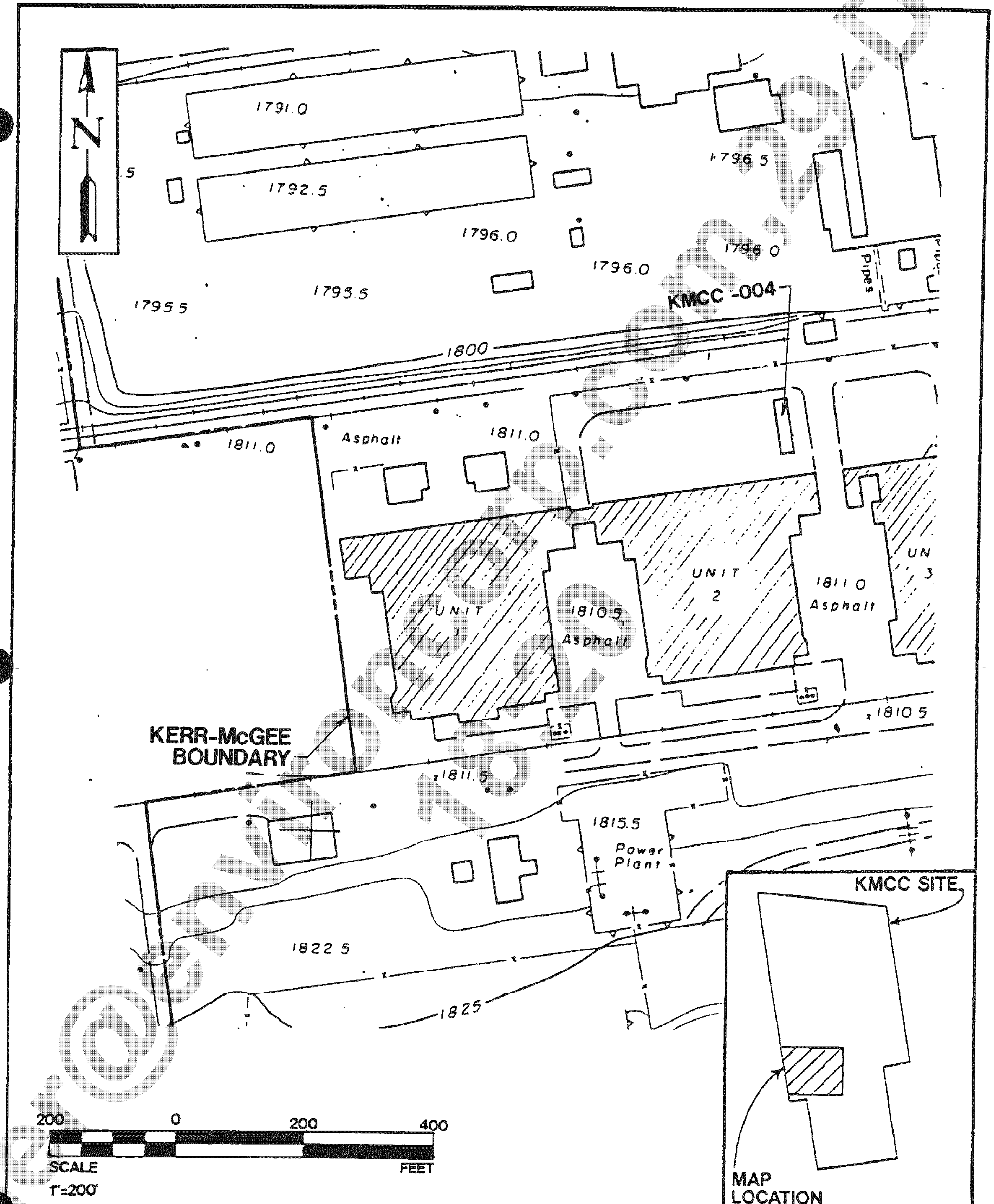
MAP 2



KLEINFELDER

MAP 3: KMCC-003 PCB STORAGE AREA

MAP 3

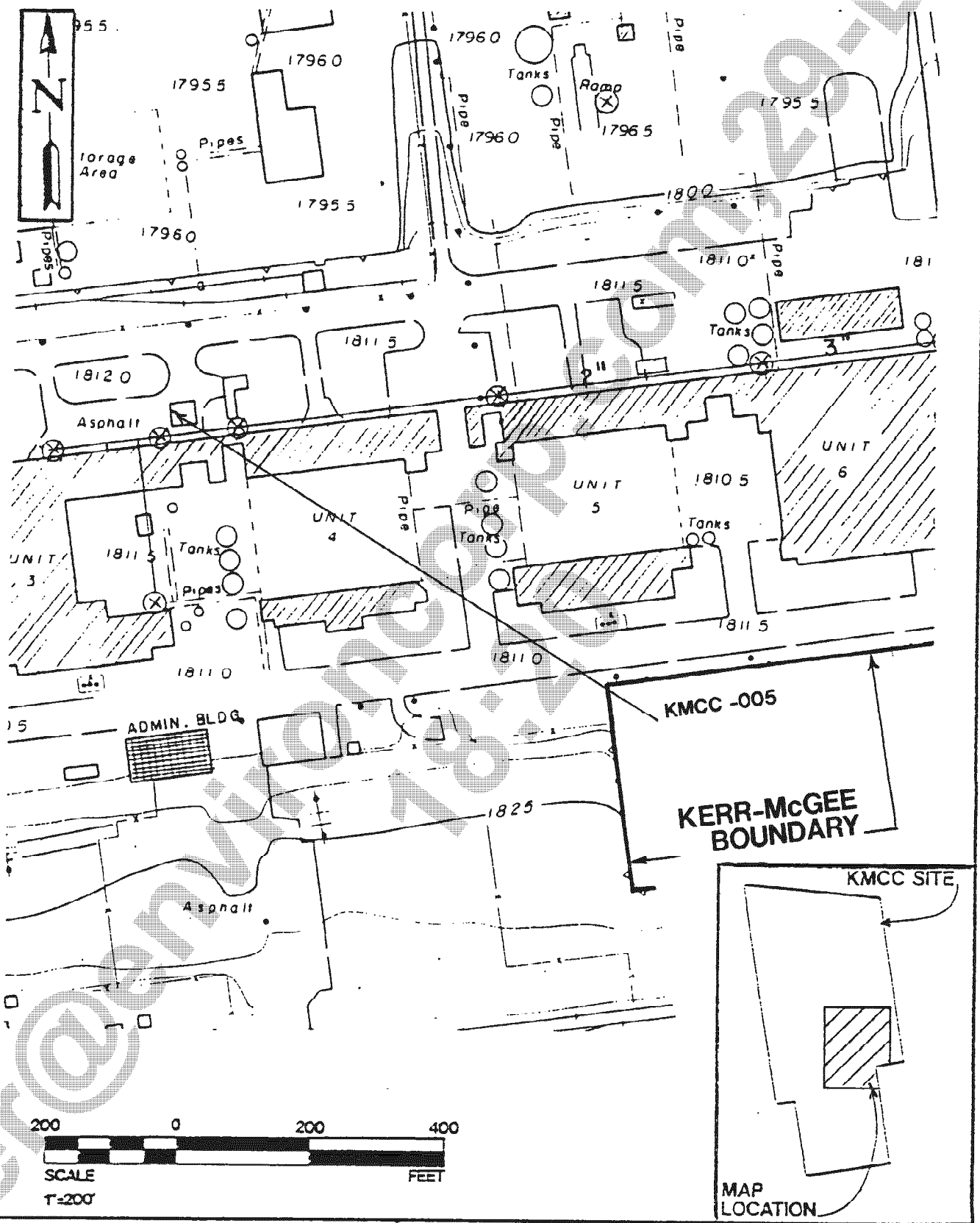


KLEINFELDER

MAP 4: KMCC-004
HAZARDOUS WASTE
STORAGE AREA

MAP
4

PR
M-6

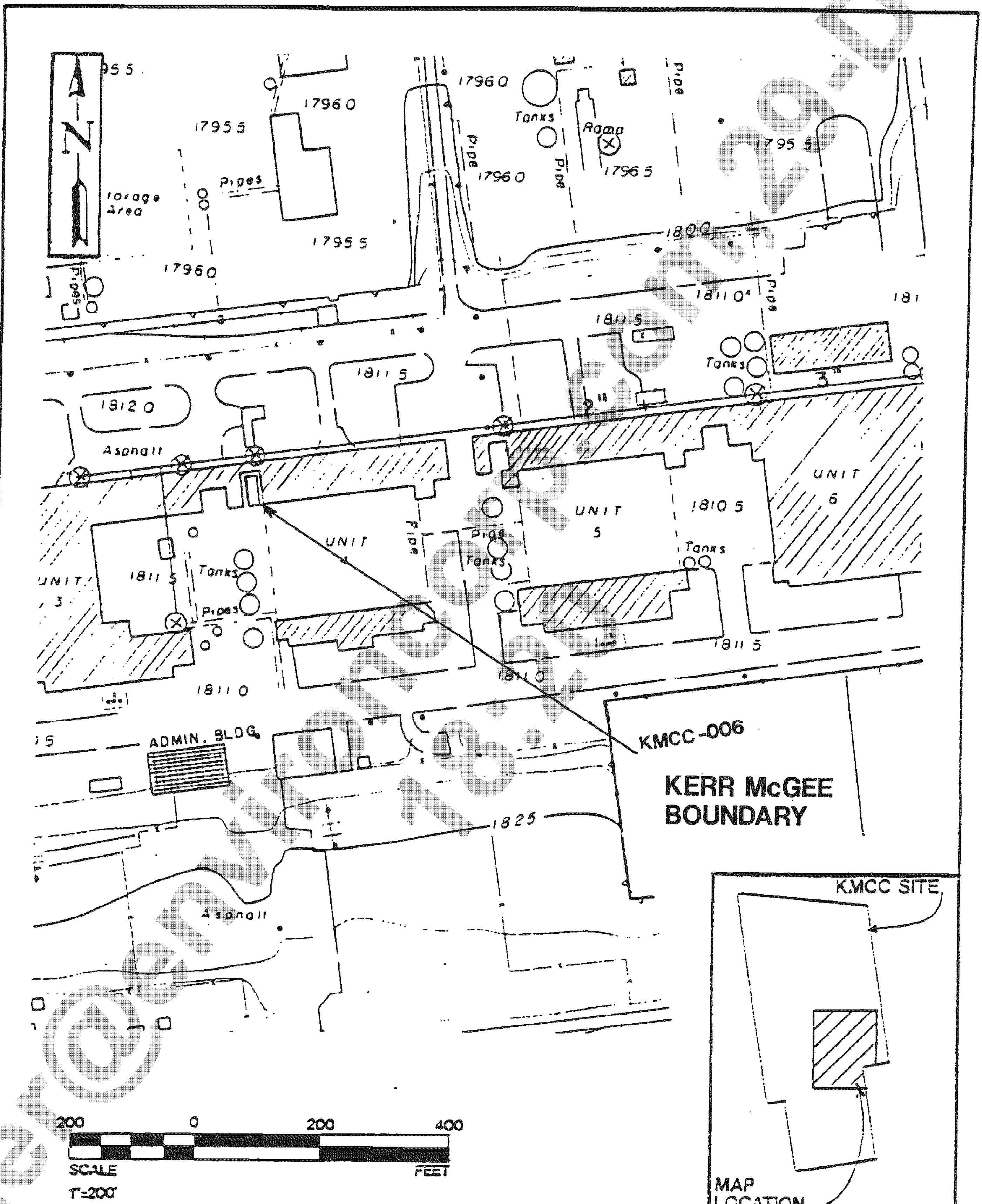


KLEINFELDER

MAP 5: KMCC-005
SODIUM CHLORATE FILTER CAKE
HOLDING AREA NORTH OF UNIT 3

MAP
5

M – 6

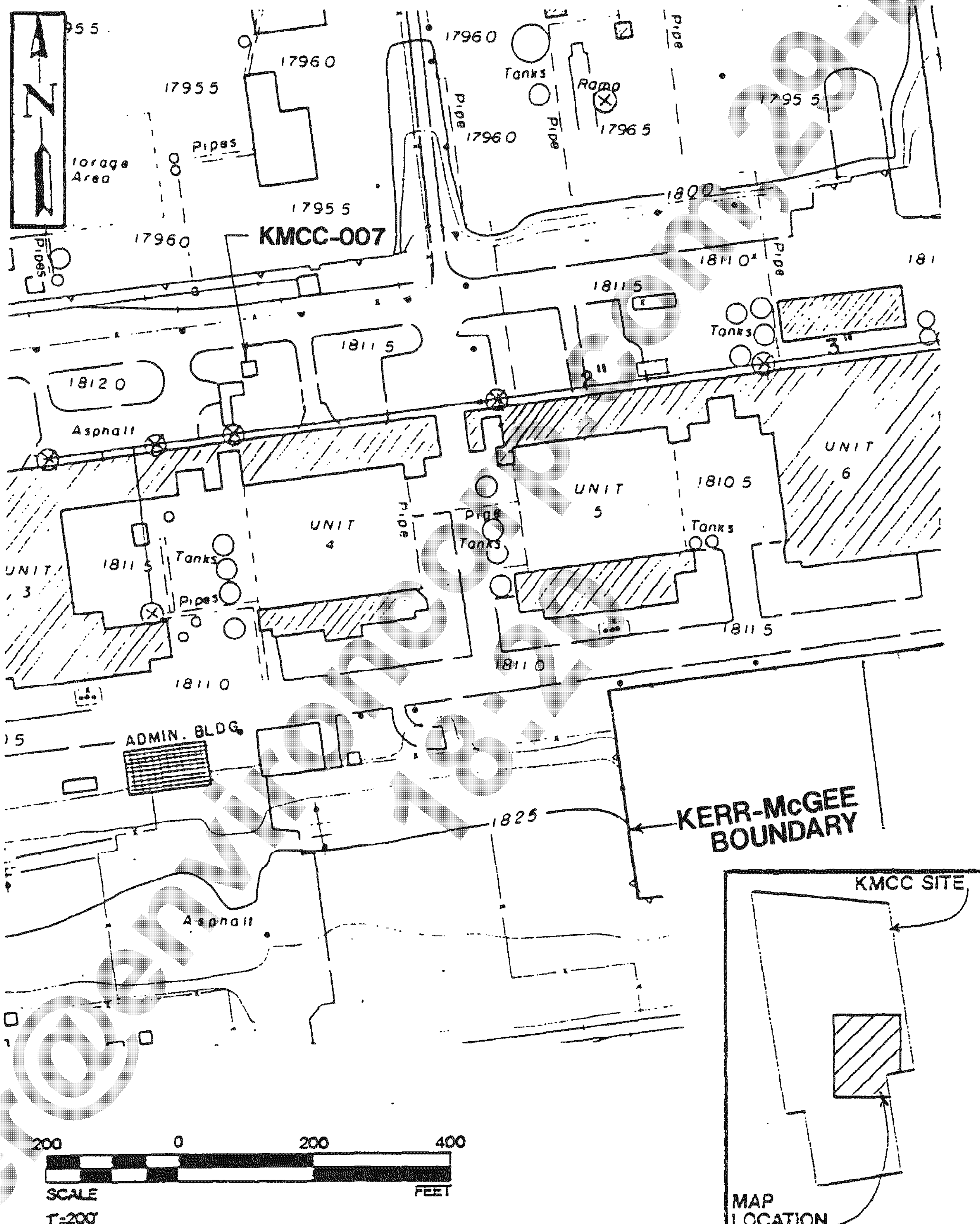


KLEINFELDER

MAP 6: KMCC-006
HAZARDOUS WASTE STORAGE

MAP
6

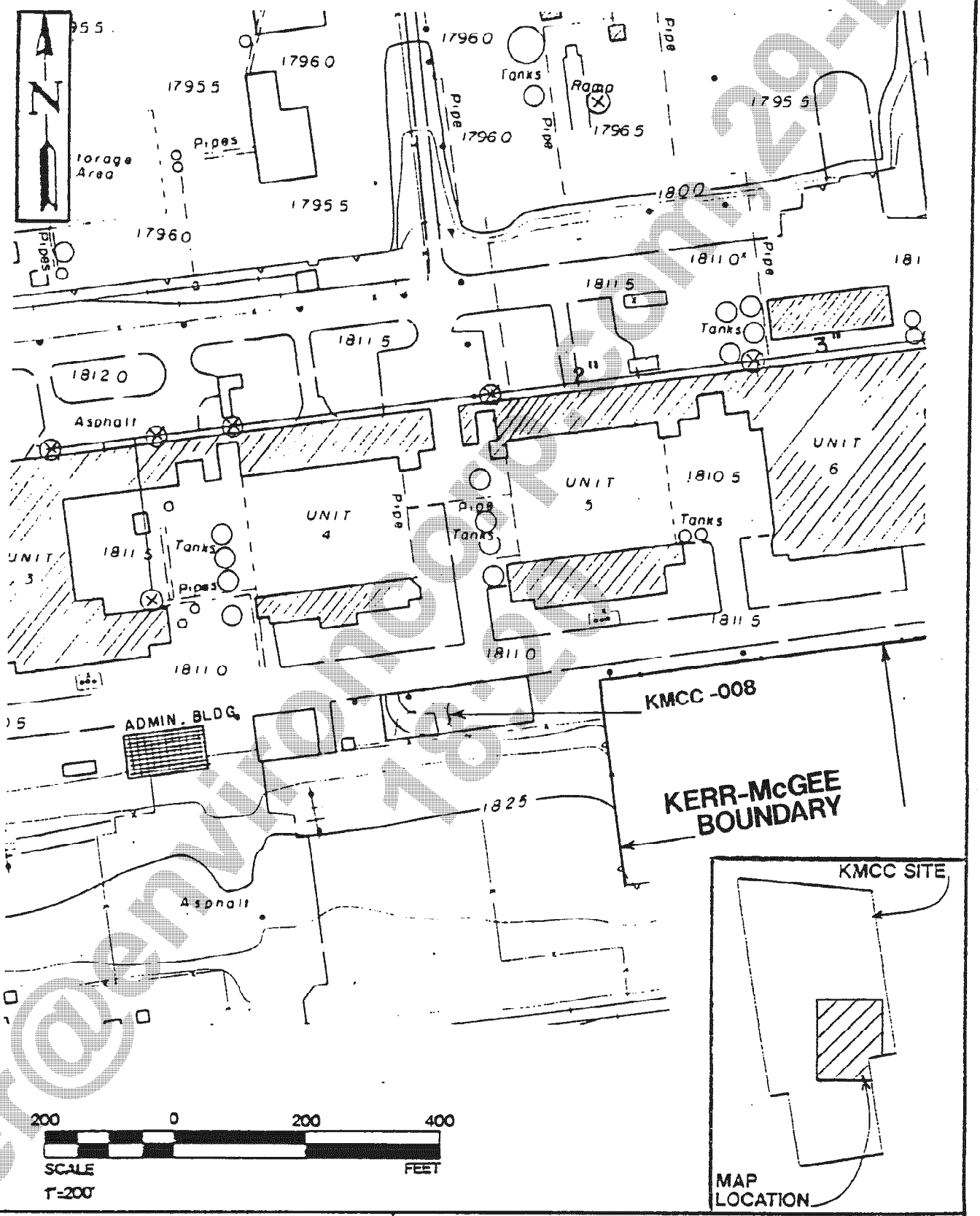
M - 6



KLEINFELDER

MAP 7: KMCC-007
PLATINUM DRYING UNIT
NORTH OF UNIT 4

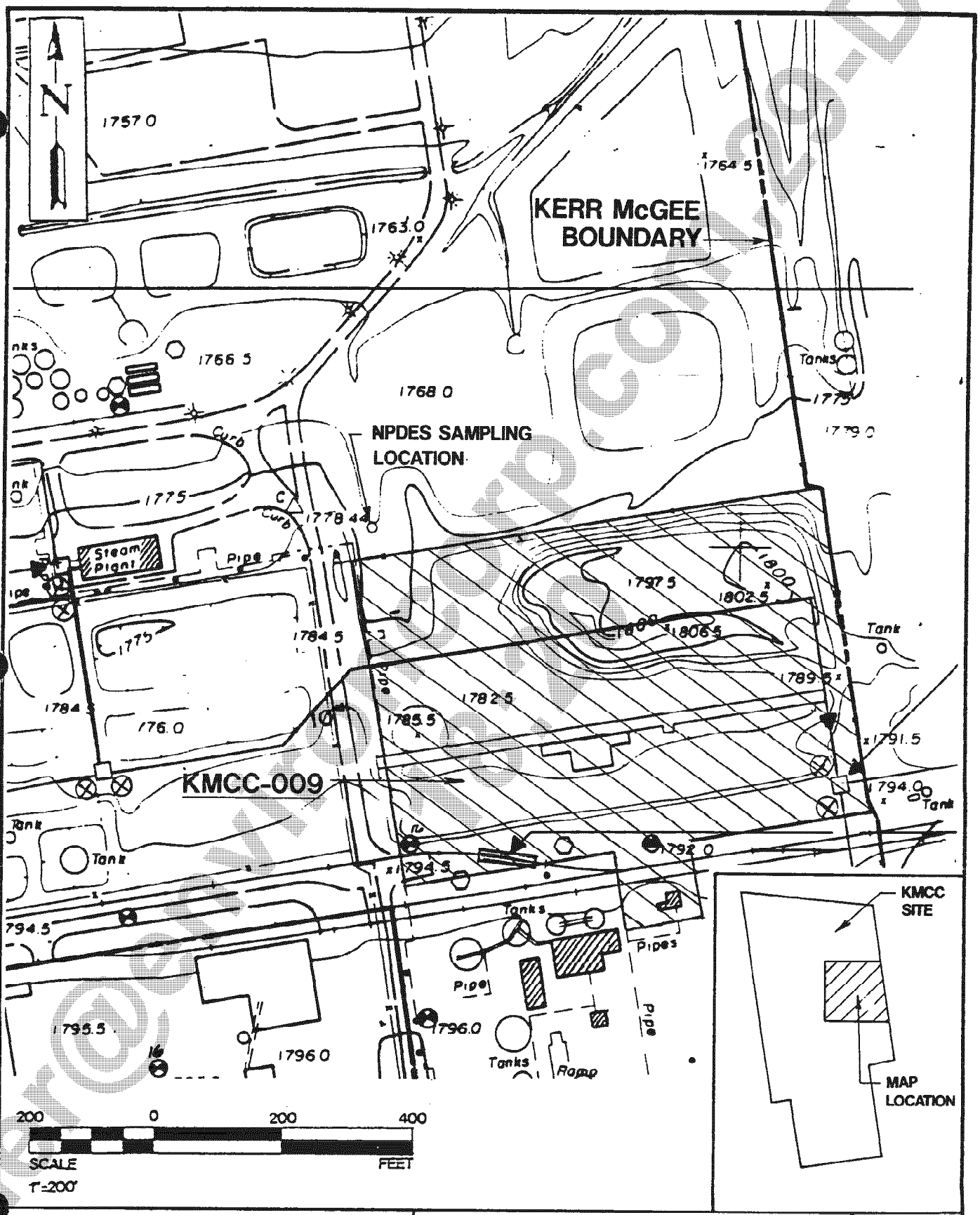
MAP
7



KLEINFELDER

MAP 8: KMCC-008
SOLID WASTE

MAP
8



KLEINFELDER

MAP 9: KMCC-009
MANGANESE TAILINGS AREA

PLATE
9

PR
M – 6

Unable to open <https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-429.jpg?projectId=34435&pageNumber=429&versionId=800101187&username=username&format=bw&enc=enc>.

Error:java.io.IOException:

Server returned HTTP response code: 500 for URL: https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-429.jpg?projectId=34435&pageNumber=429&versionId=800101187&username=username&format=bw&enc=enc

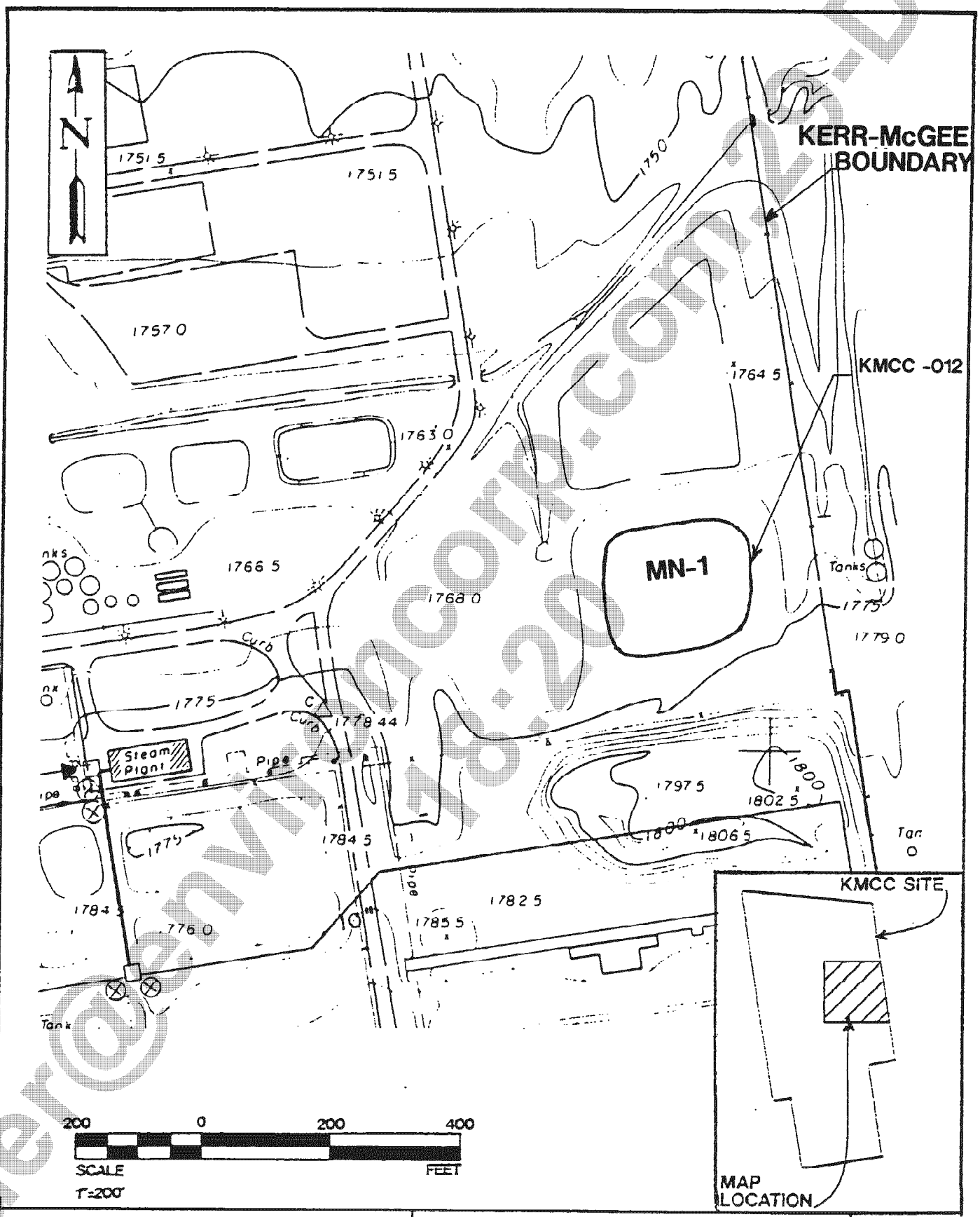
Error: Please make sure this file can be accessed and that it is a supported file type.

Unable to open <https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-430.jpg?projectId=34435&pageNumber=430&versionId=800101187&username=username&format=bw&enc=enc>.

Error:java.io.IOException:

Server returned HTTP response code: 500 for URL: https://datasite.merrillcorp.com/bidder/servlet/tiff/800101187-430.jpg?projectId=34435&pageNumber=430&versionId=800101187&username=username&format=bw&enc=enc

Error: Please make sure this file can be accessed and that it is a supported file type.



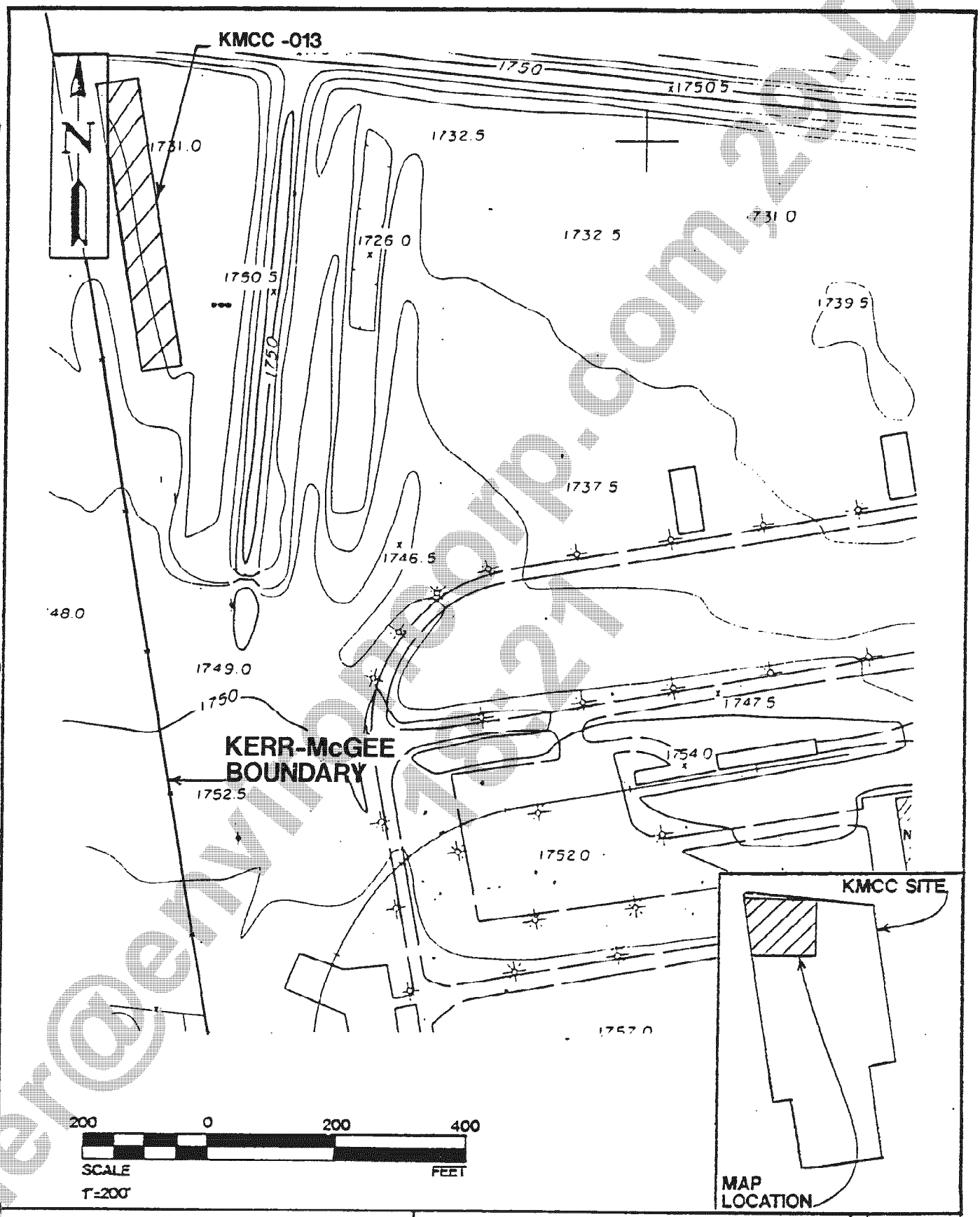
KLEINFELDER

MAP 12: KMCC-012, MN_1

MAP 12

PR

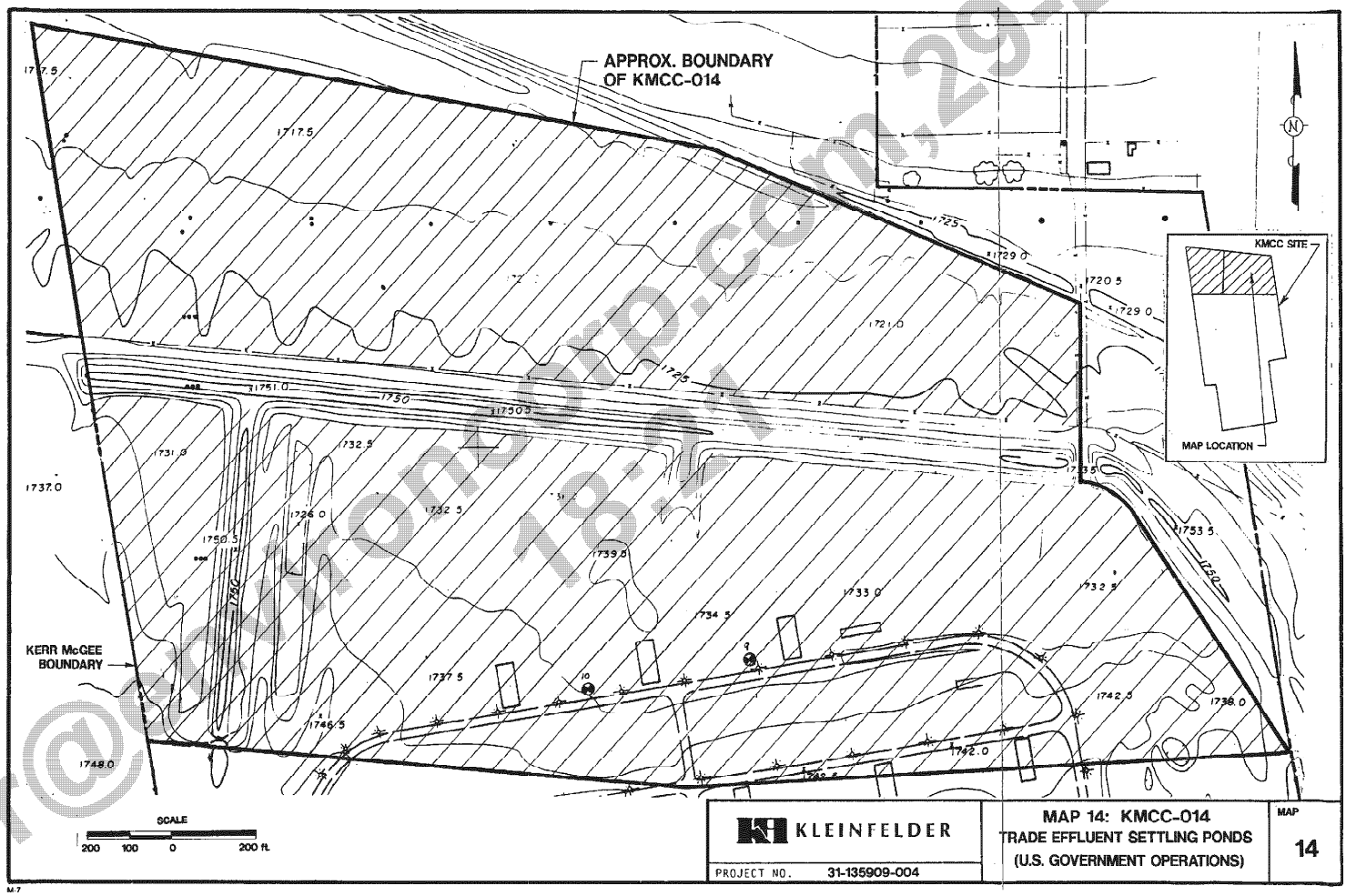
M – 6

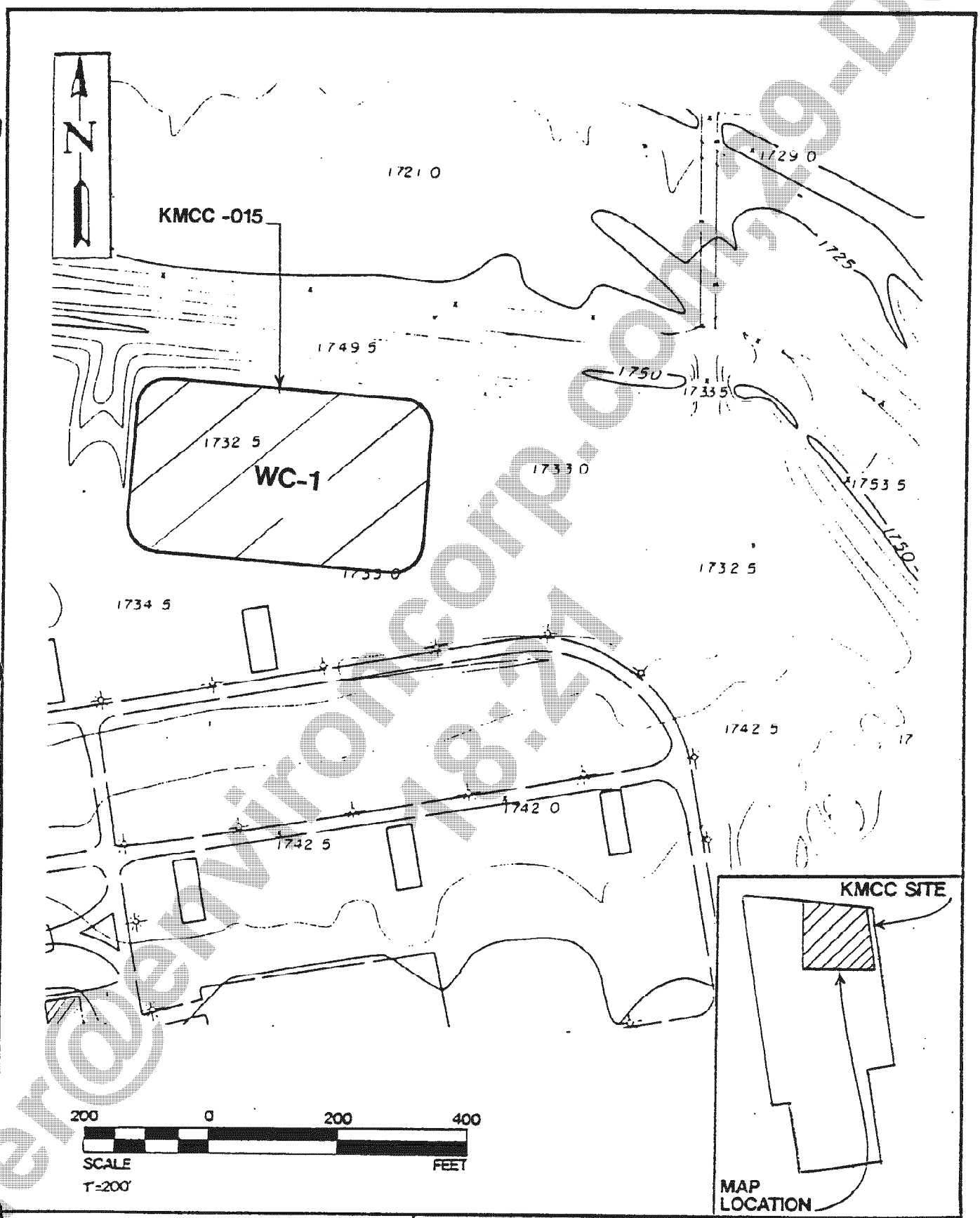


KLEINFELDER

MAP 13: KMCC-013

MAP 13

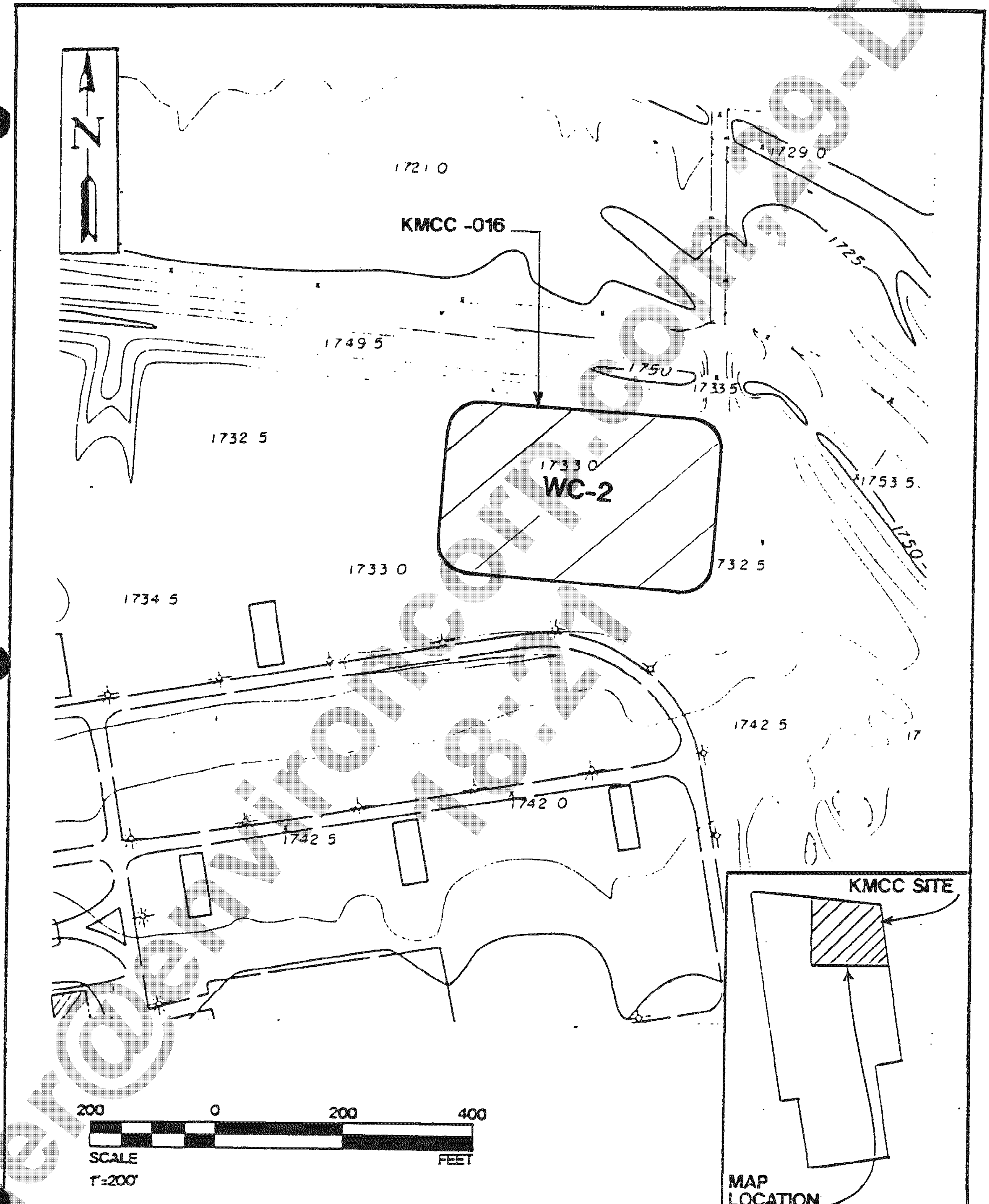




KLEINFELDER

MAP 15: KMCC-015
WC-1 (WC-WEST)

MAP
15

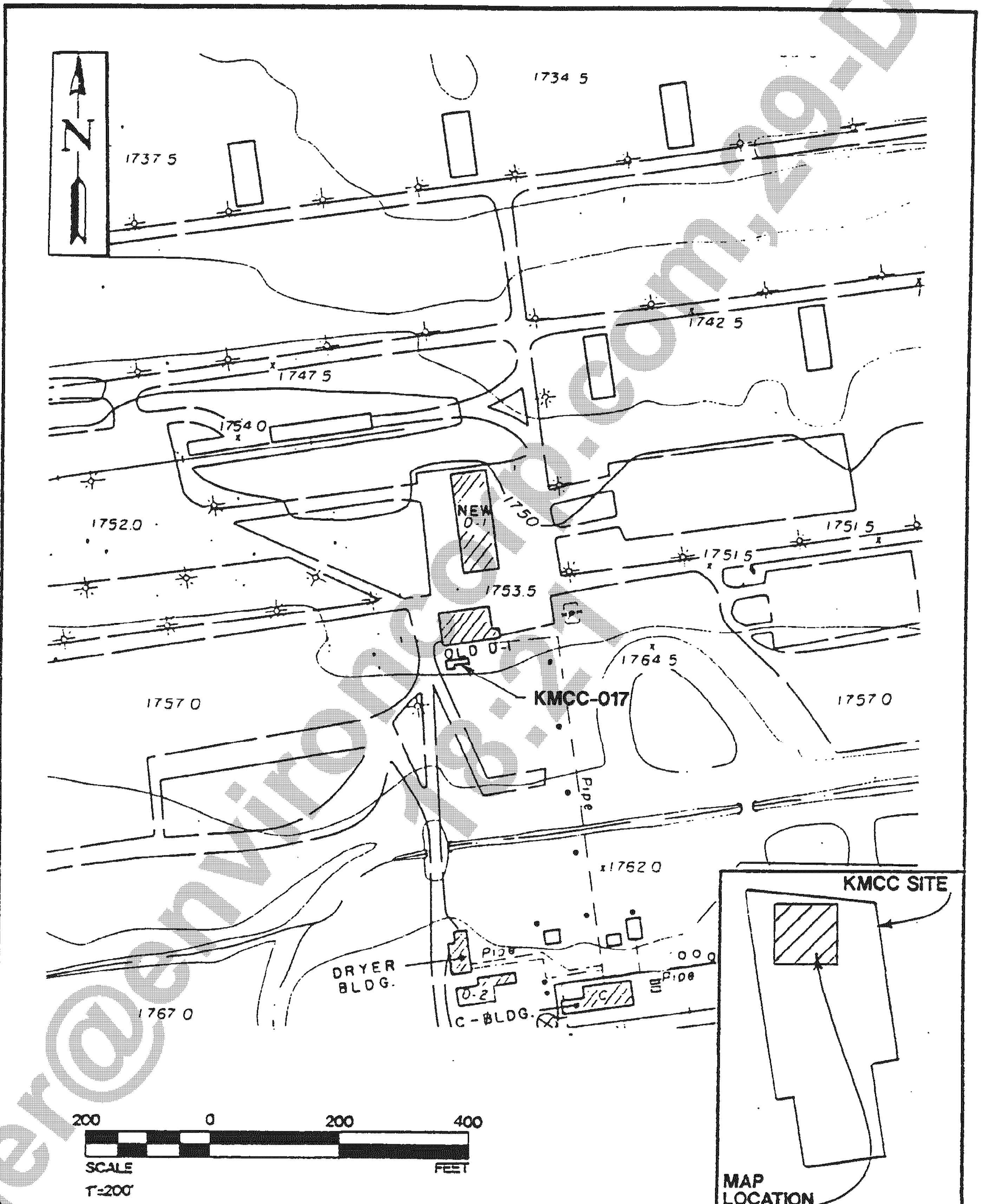


KLEINFELDER

MAP 16: KMCC-016
WC-2 (WC-EAST)

MAP
16

PR
M - 6



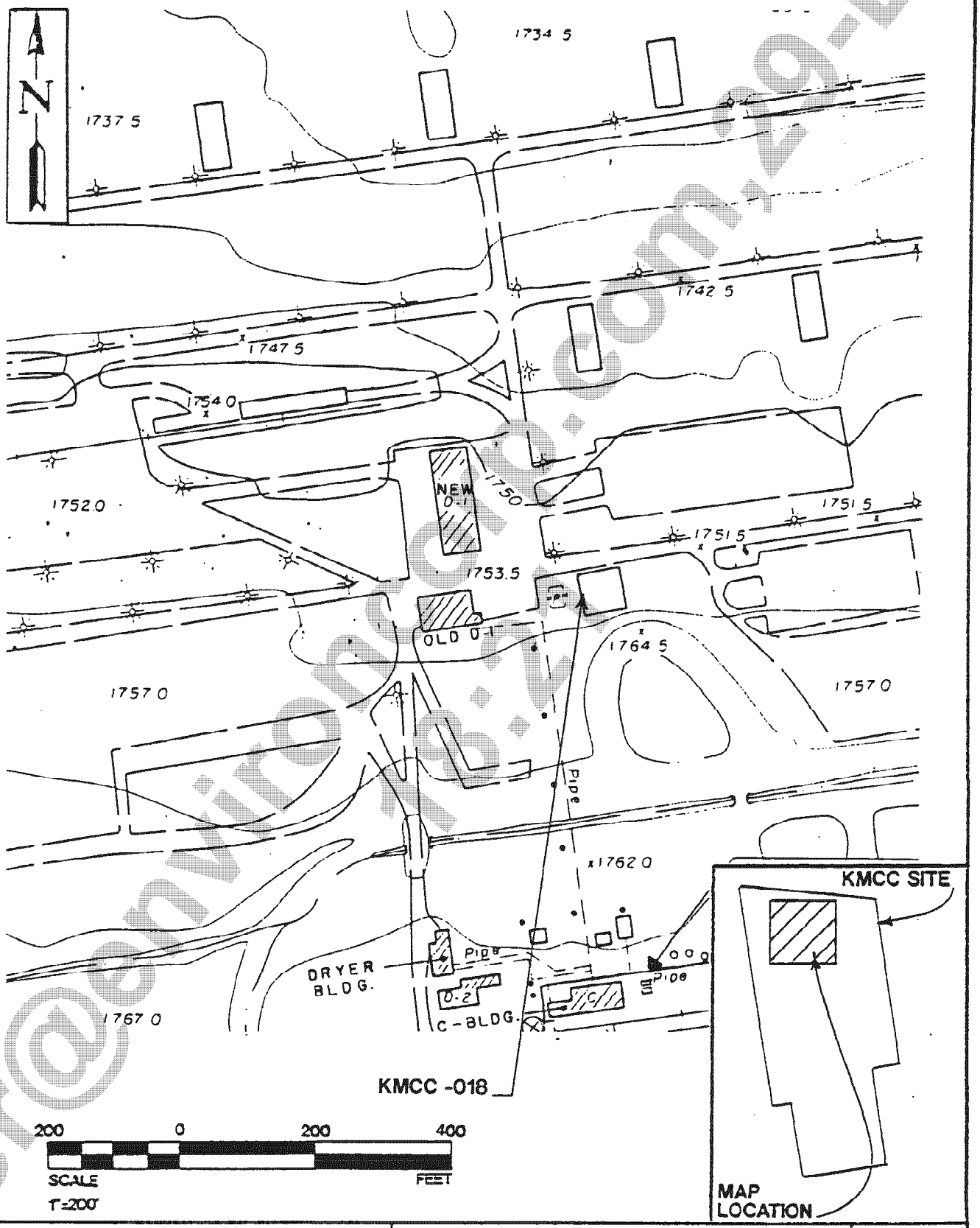
KLEINFELDER

MAP 17: KMCC-017
AMMONIUM PERCHLORATE AREA

MAP
17

PR

M - 6



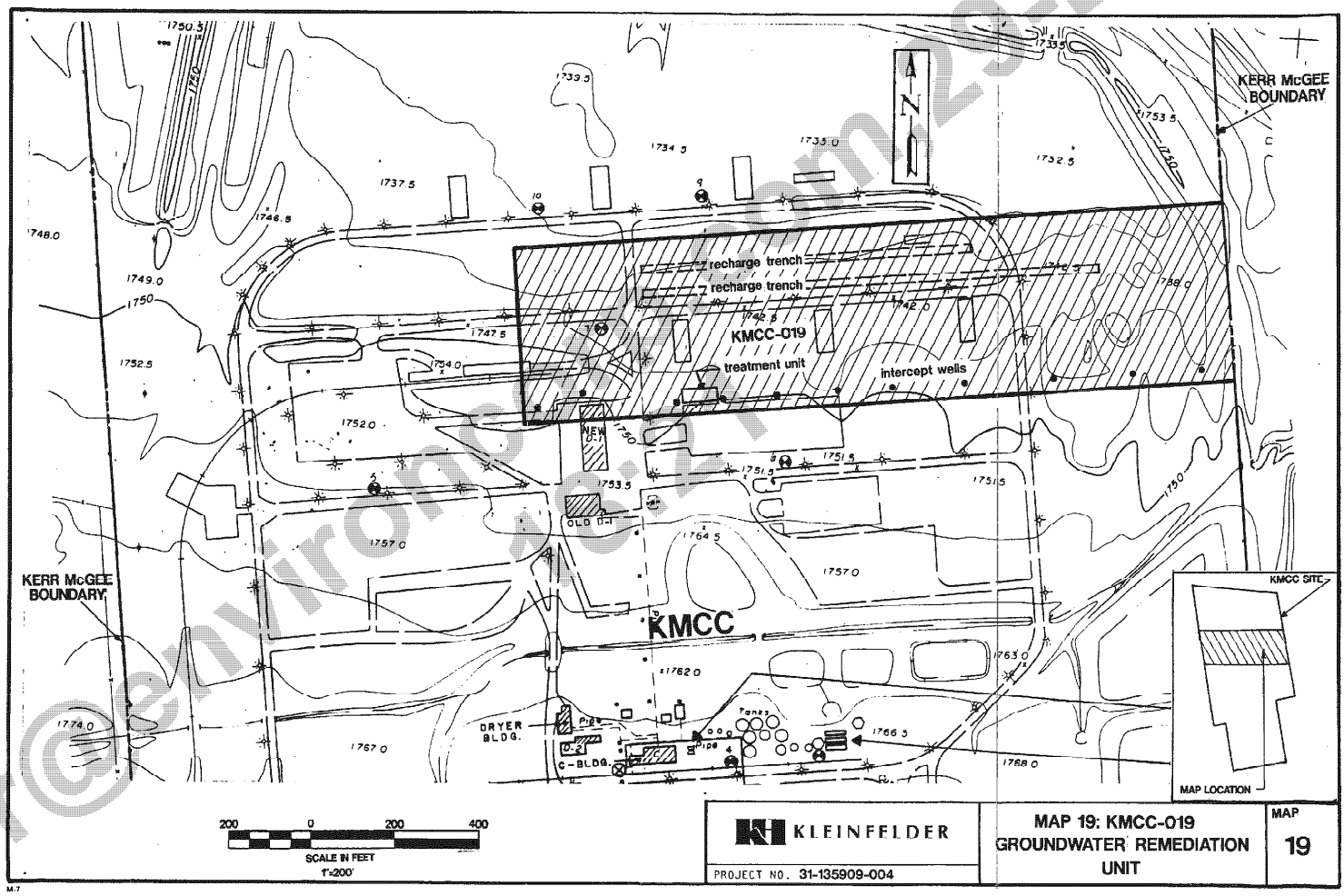
KLEINFELDER

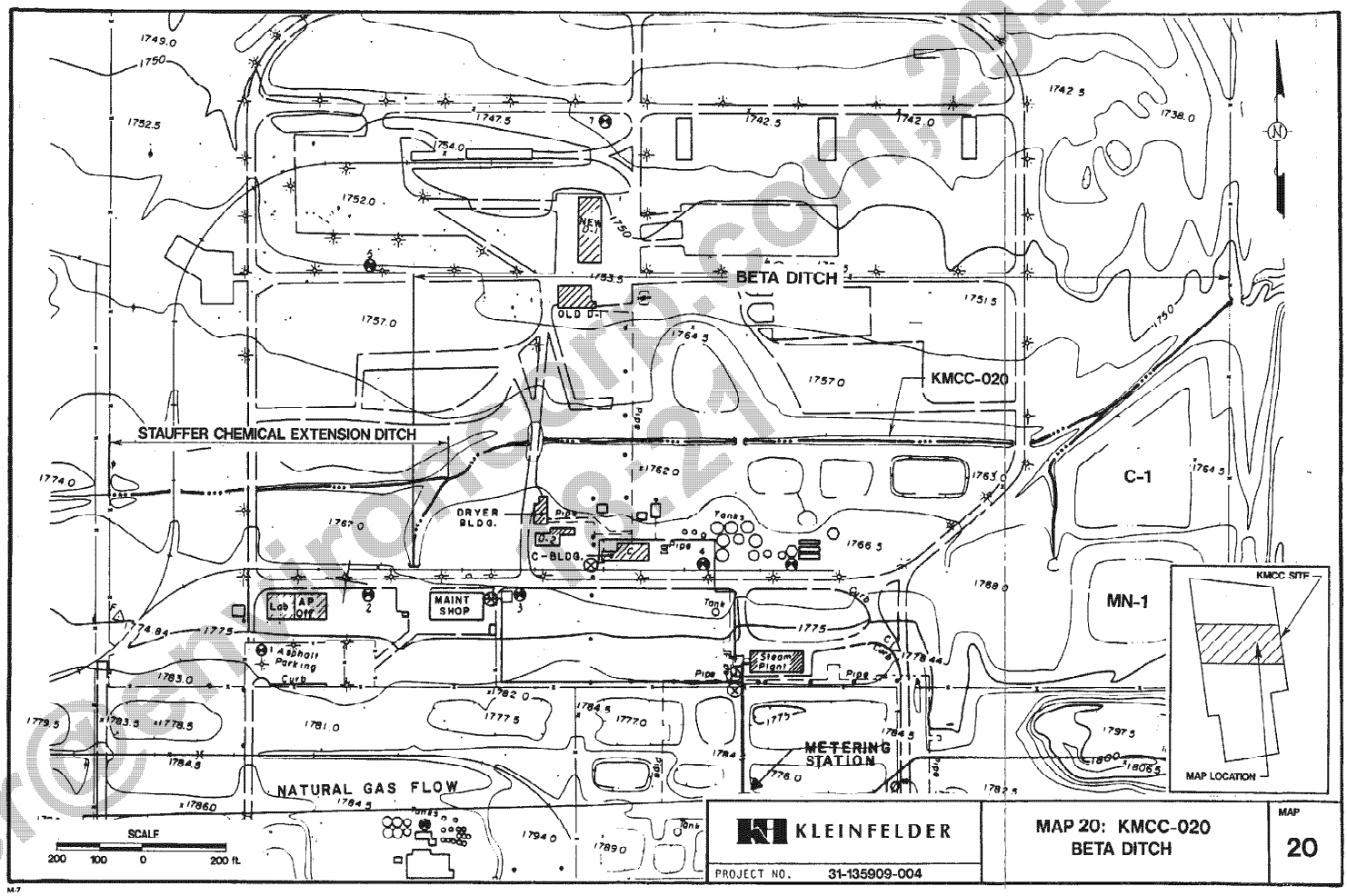
MAP 18: KMCC-018

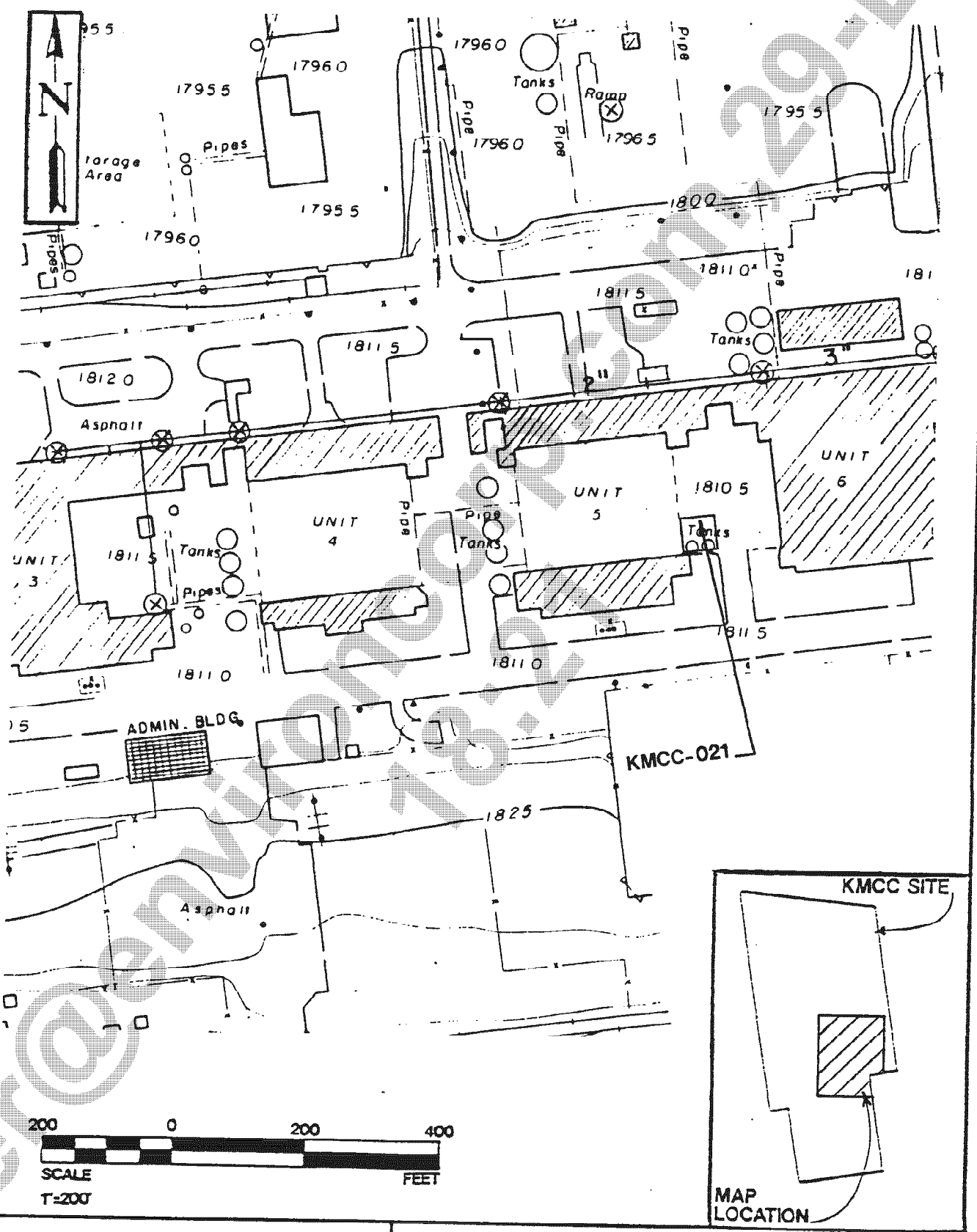
DRUM CRUSHING AREA

MAP

18







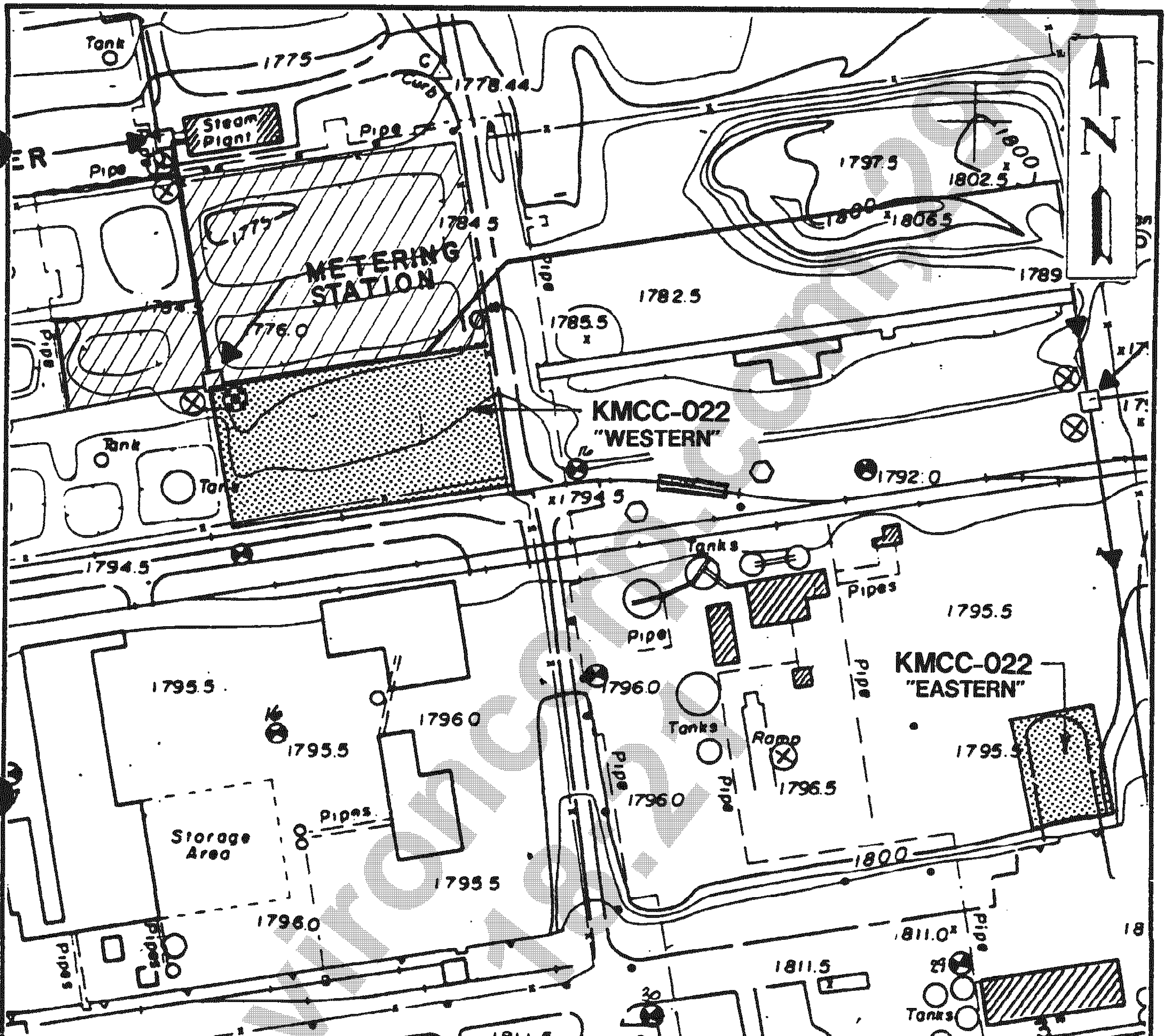
KLEINFELDER

MAP 21: KMCC-021
SODIUM PERCHLORATE PLATINUM

MAP 21

PR(

M – 6



Legend:

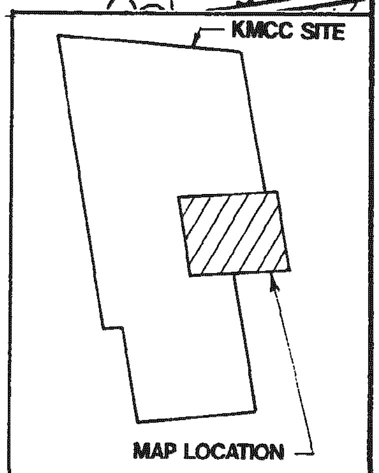
Tailings area known from KMCC documents

Tailings area inferred from aerial photography and/or field observations

200 0 200 400

SCALE FEET

1"=200'



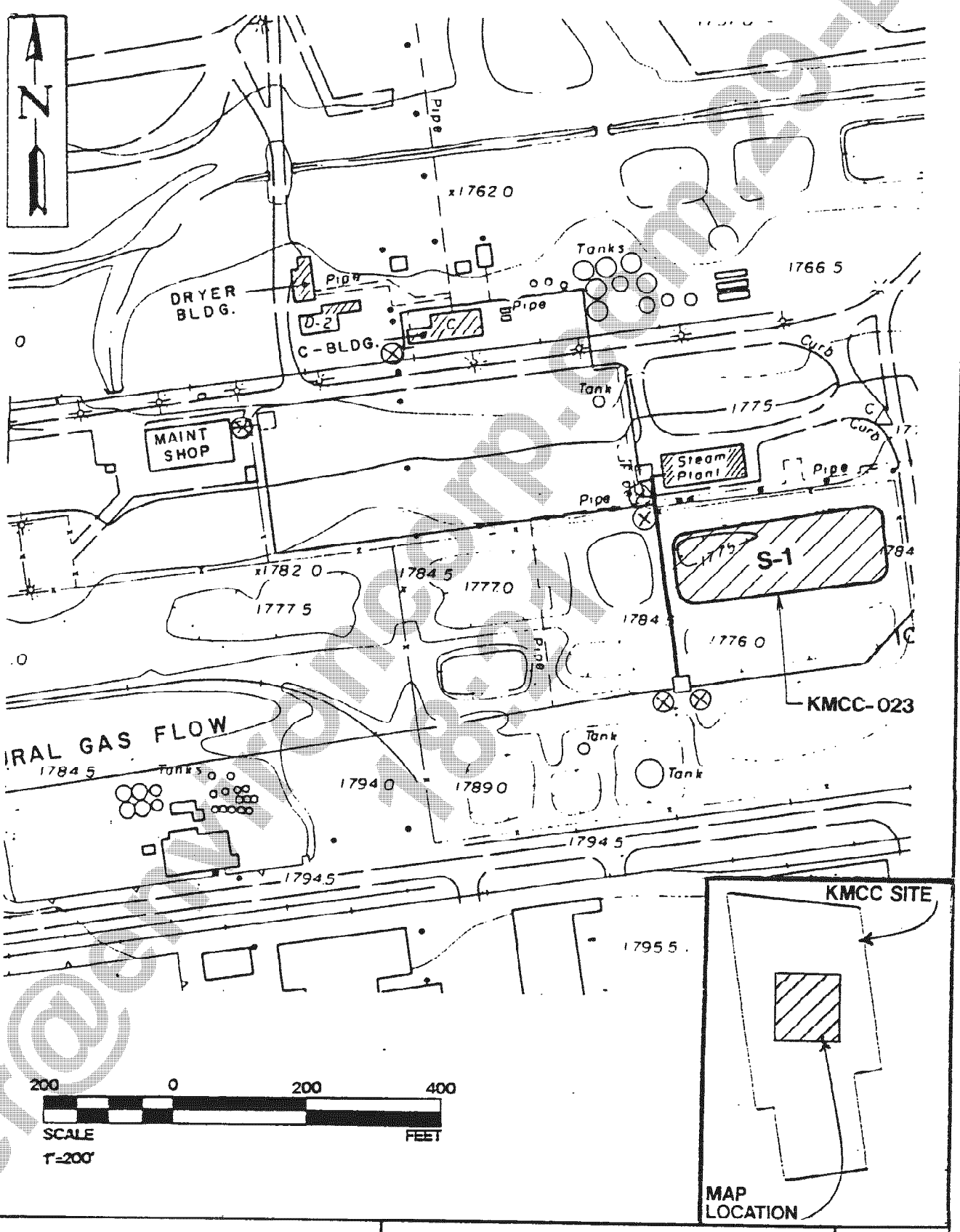
KLEINFELDER

MAP 22: KMCC-022
FORMER MANGANESE

MAP
22

PR

M - 6



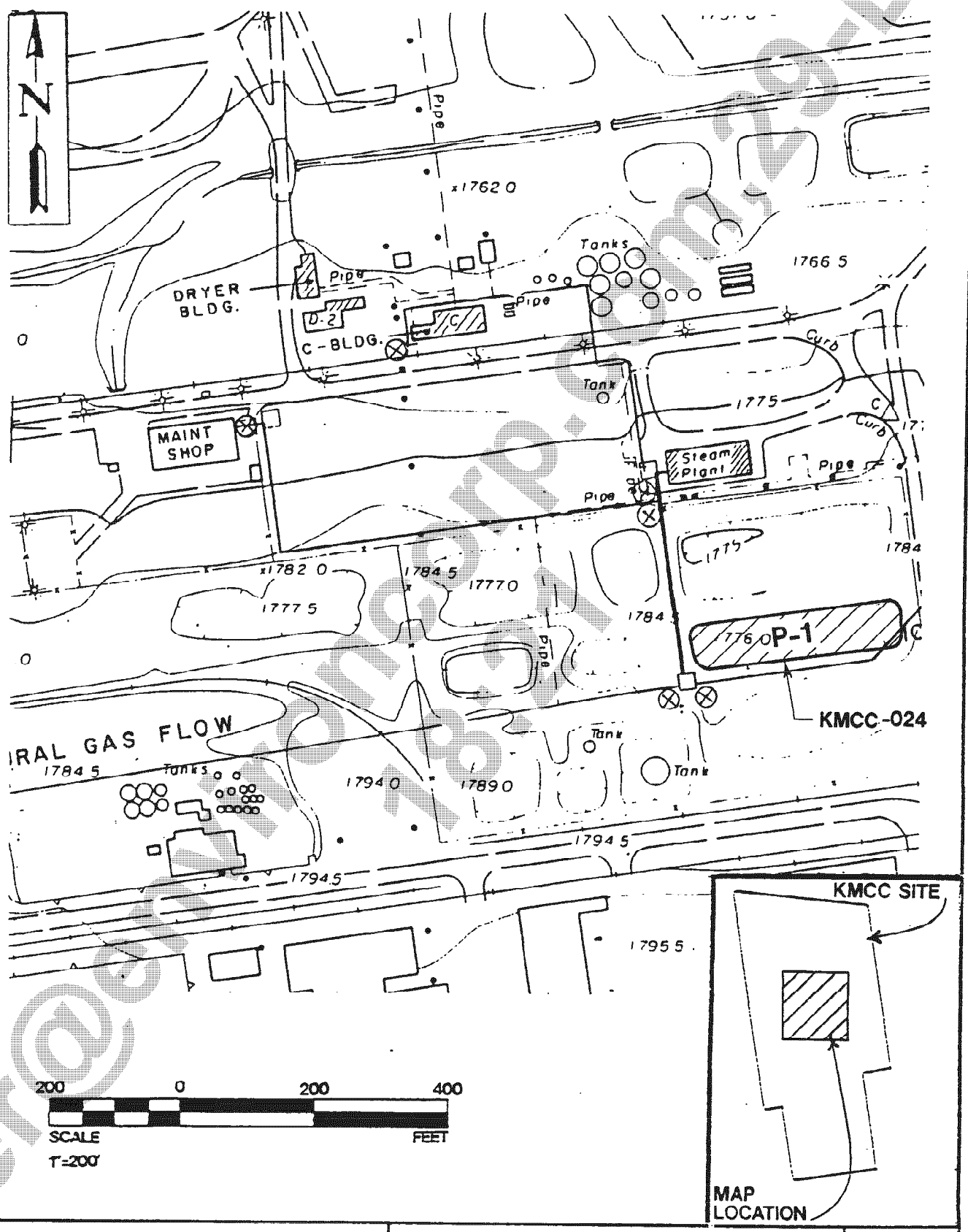
KLEINFELDER

MAP 23: KMCC-023
CLOSED SURFACE

MAP 23

PRO

M-6



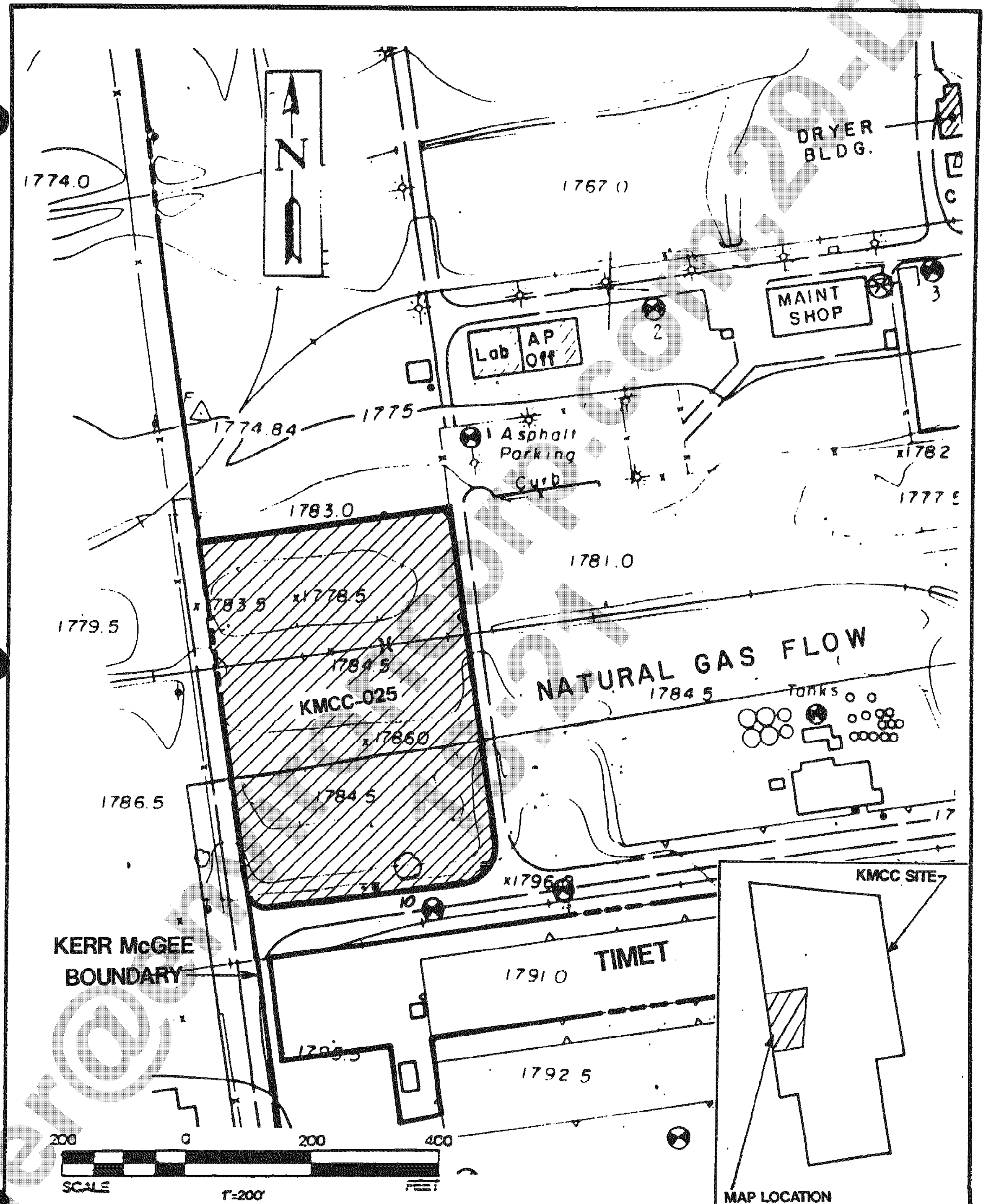
KLEINFELDER

MAP 24: KMCC-024 CLOSED SURFACE

MAP 24

PR

M-6



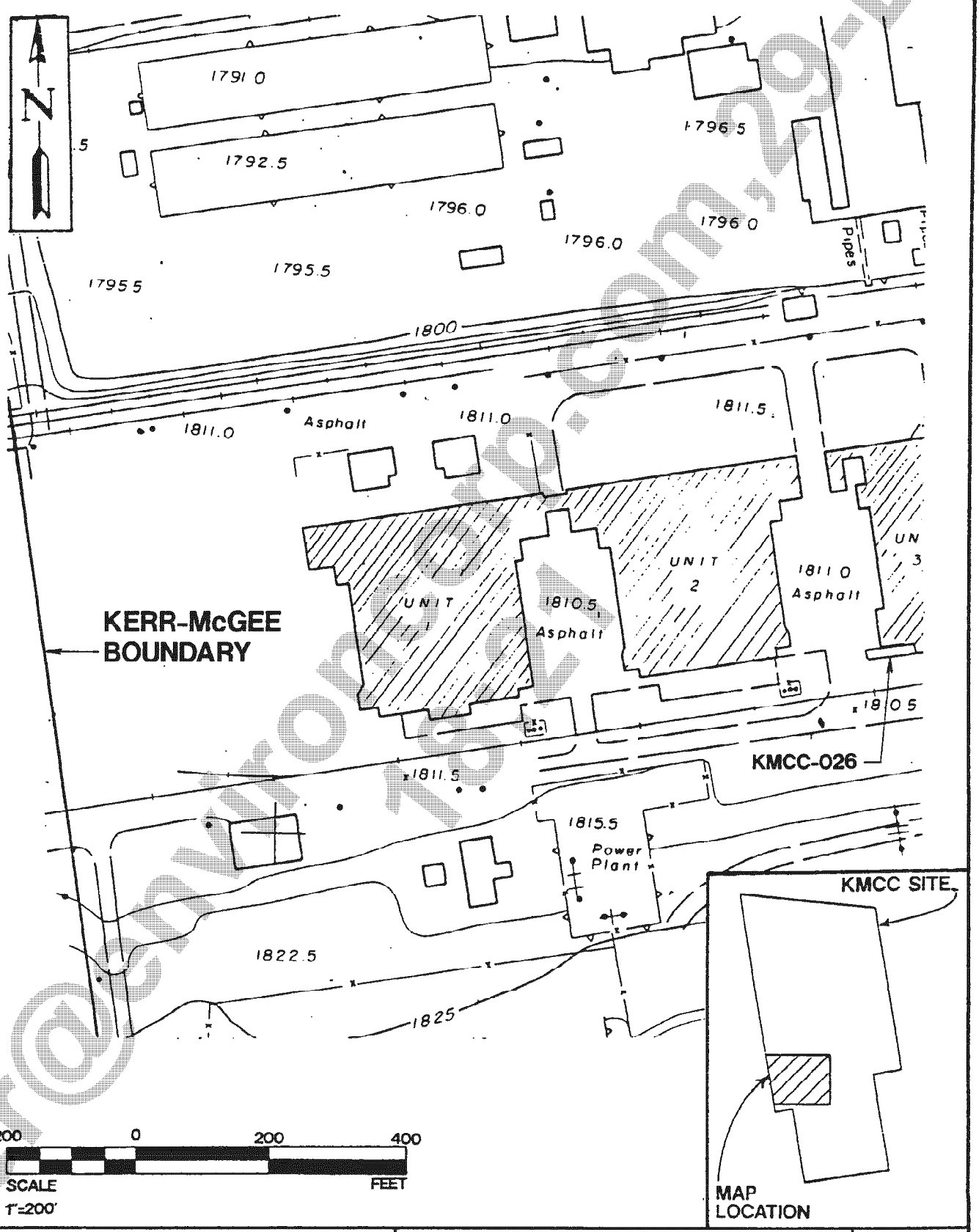
KLEINFELDER

MAP 25: KMCC-025
TRUCK EMPTYING/DUMP SITE

MAP
25

PF

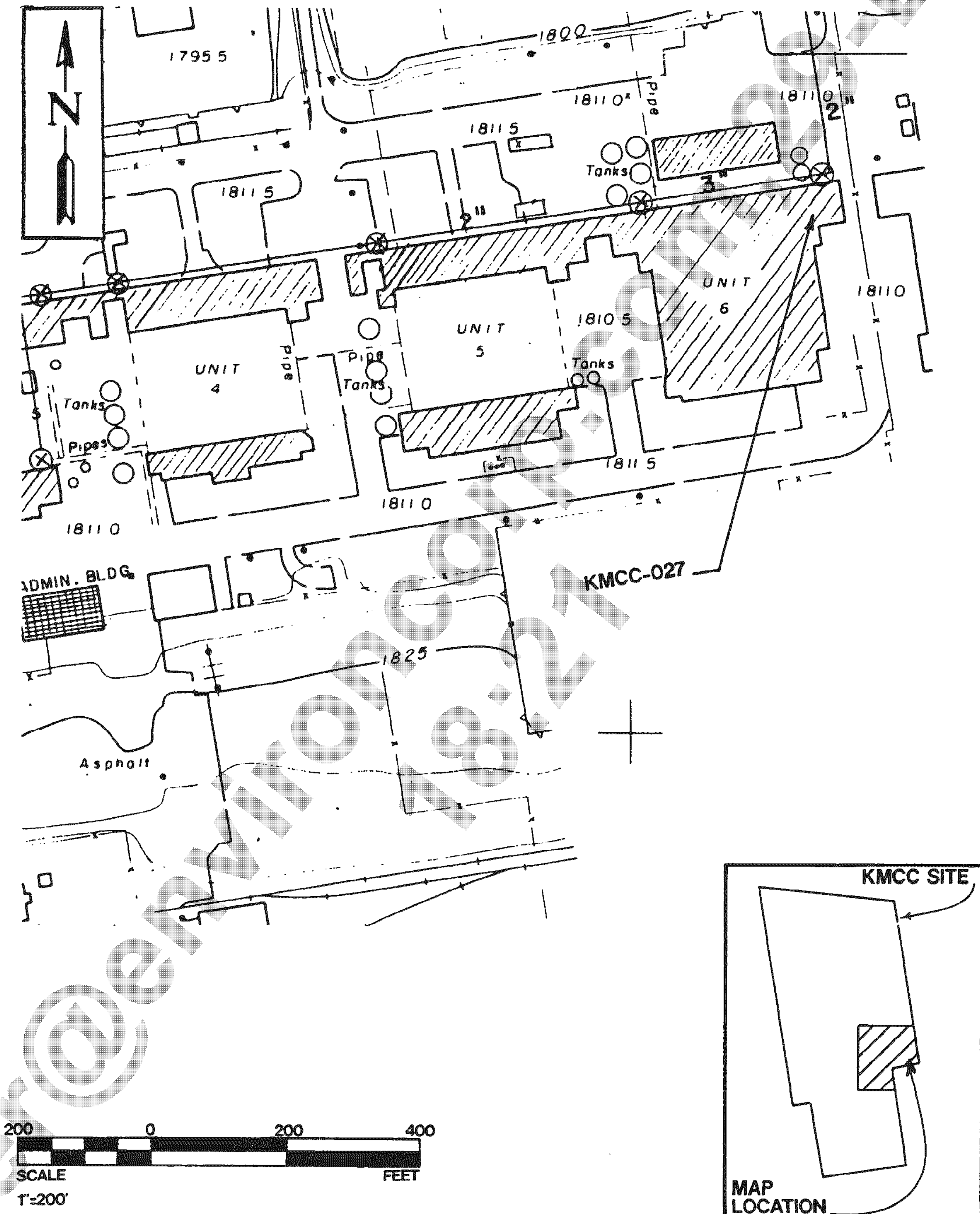
M – 6



KLEINFELDER

MAP 26: KMCC-026
FORMER SATELLITE ACCUMULATION

PLATE
26

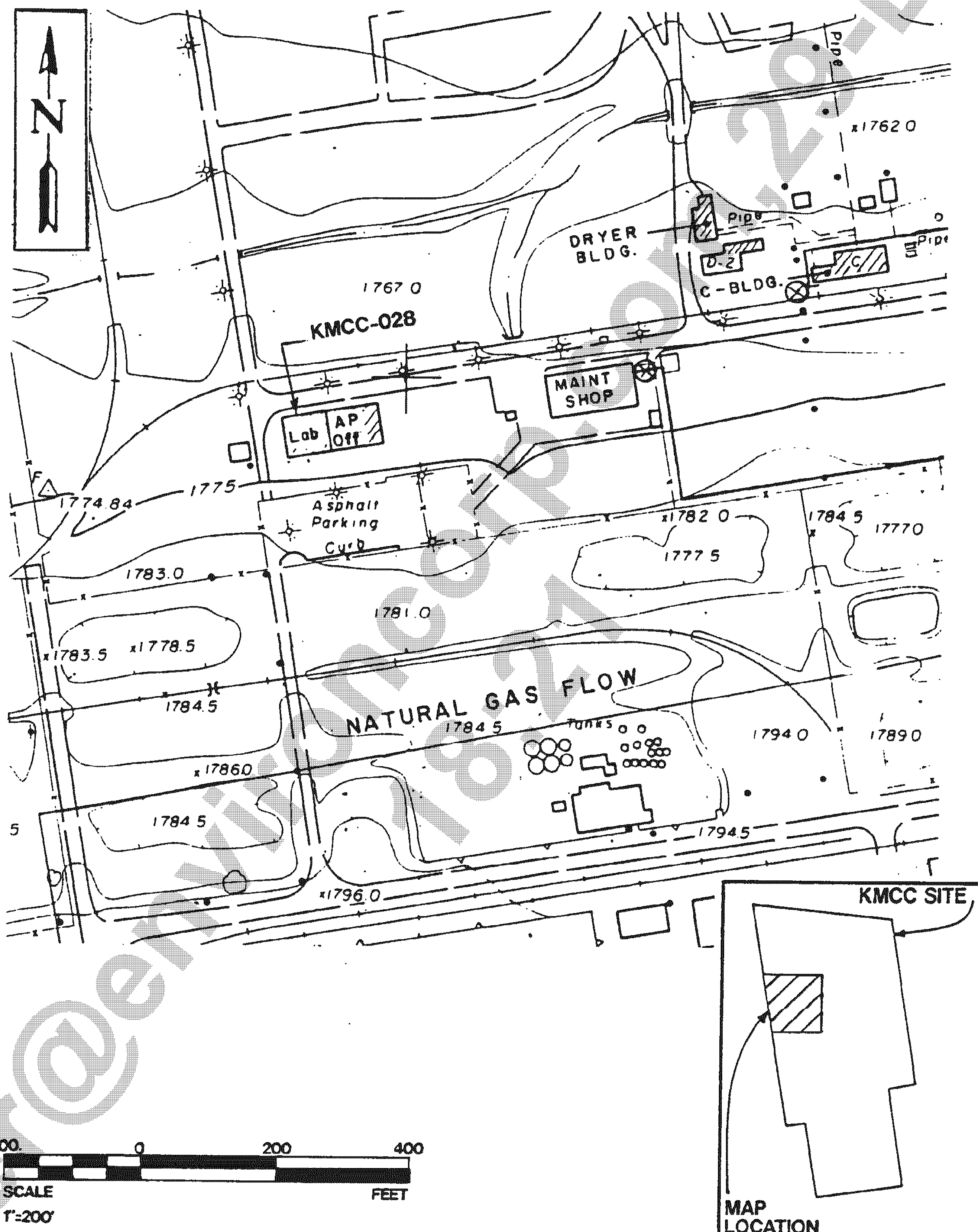


KLEINFELDER

MAP 27: KMCC-027
FORMER SATELLITE ACCUMULATION

MAP
27

PR
M - 6



KLEINFELDER

MAP 28: KMCC-028

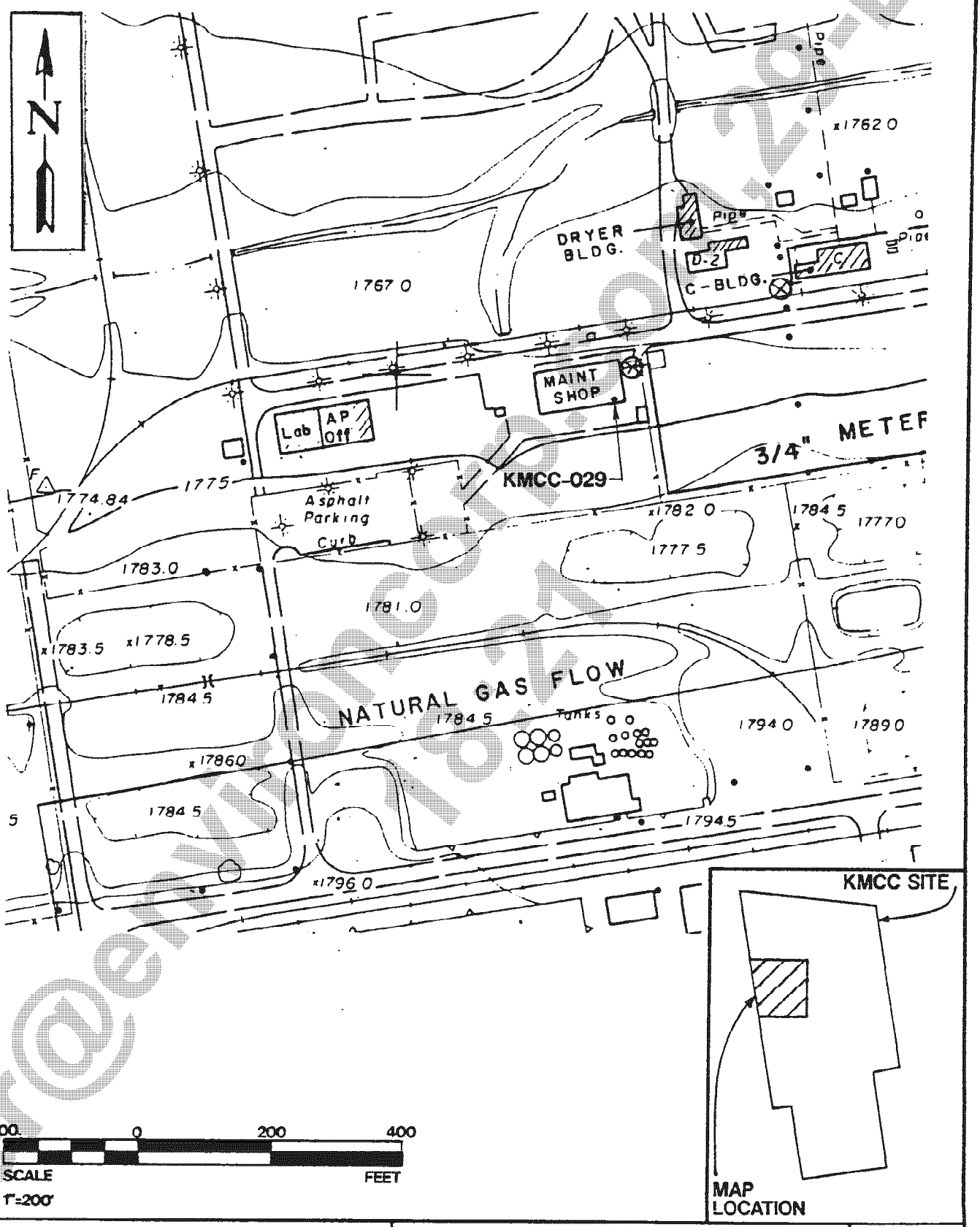
SATELLITE ACCUMULATION POINT

MAP

28

PR

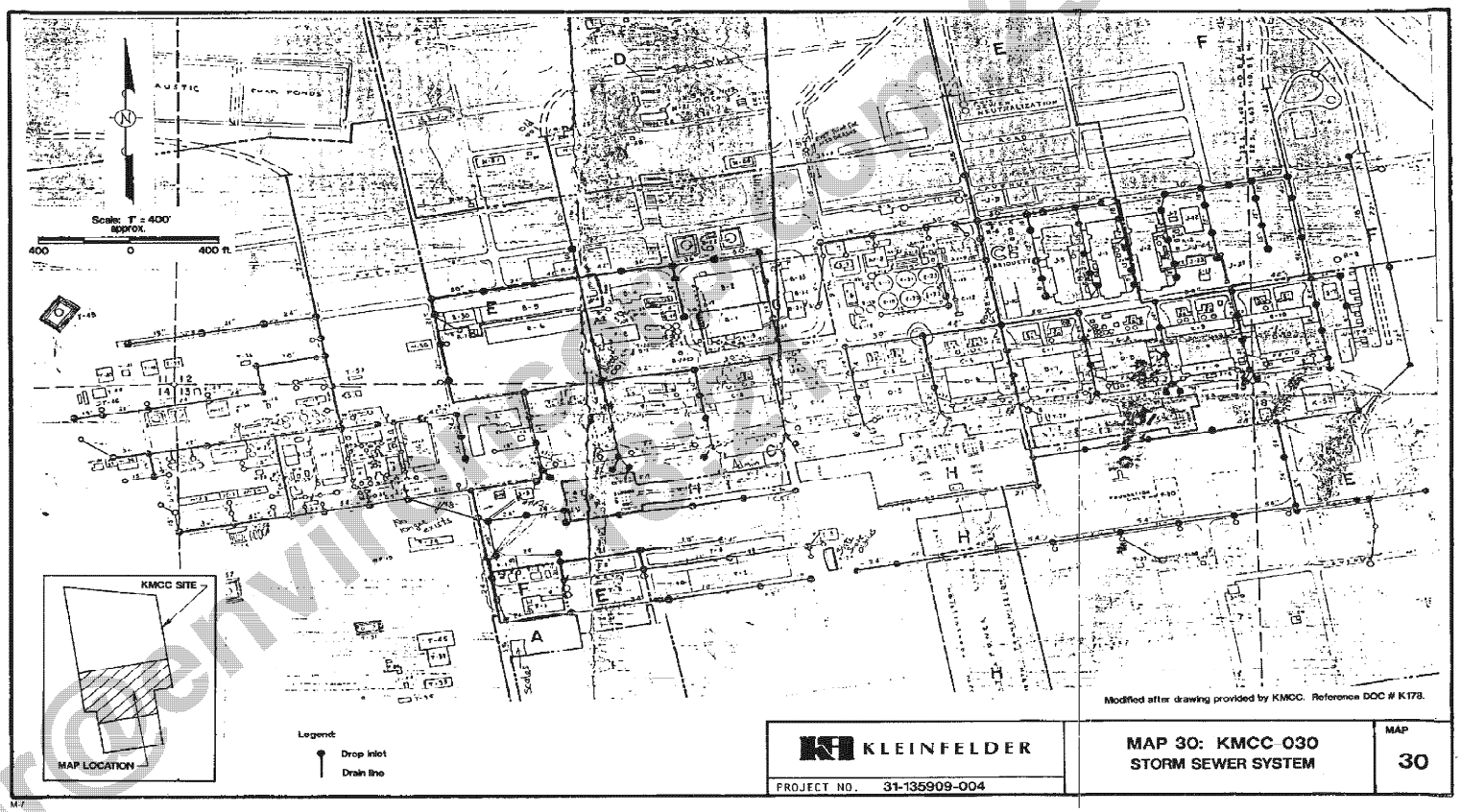
M – 6

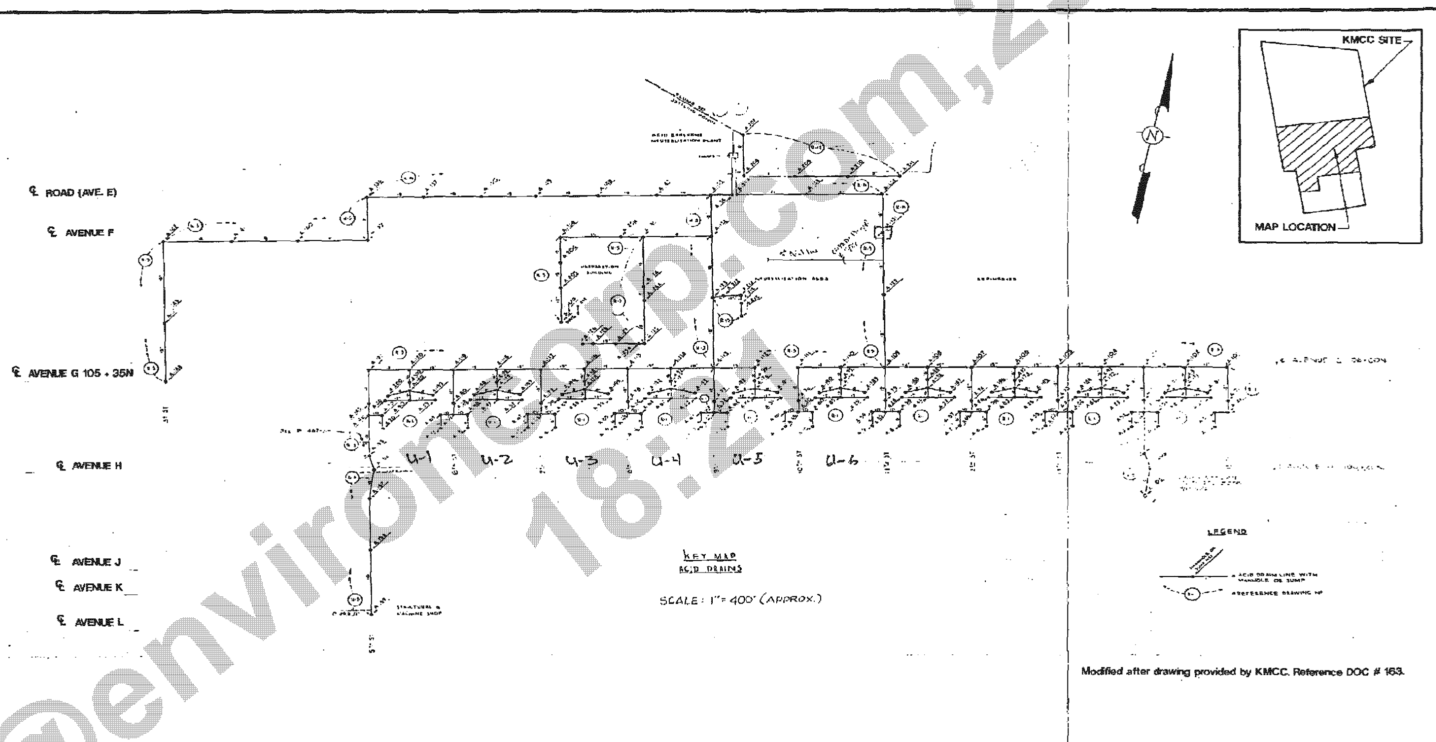


KLEINFELDER

MAP 29: KMCC-029

MAP 29





KLEINFELDER

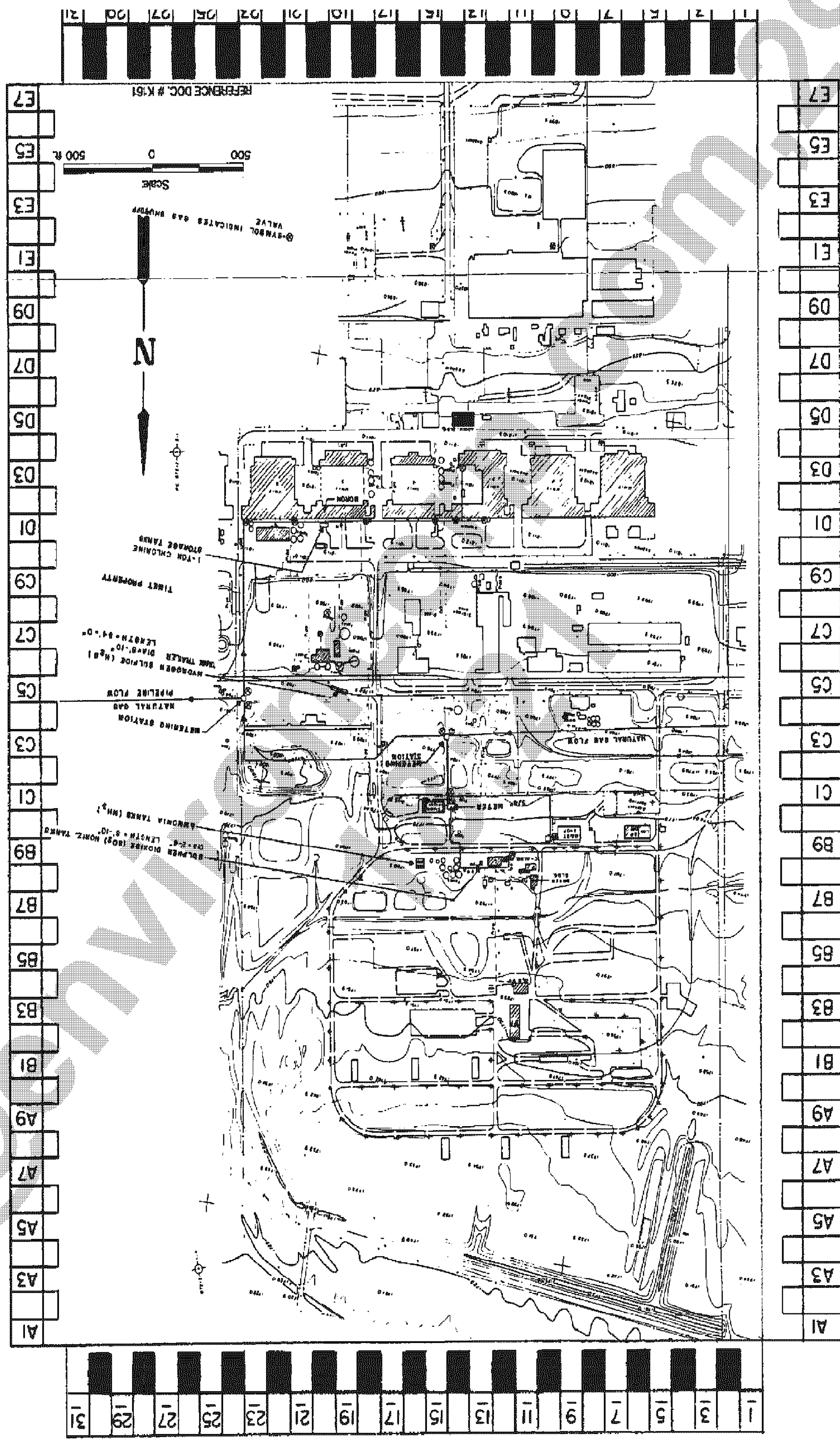
PROJECT NO. 31-135909-004

MAP 31: KMCC-031
ACID DRAIN SYSTEM

MAP
31

M-7

KMC DR
04-0008853


REFERENCE DOC. # K161
Scale
500 ft.
N
SYMBOL INDICATES GAS SHUTOFF VALVE
BORON
1-TON CHLORINE STORAGE TANKS
FIRST PROPERTY
HYDROGEN SULFIDE (H2S) TANK TRAILER
NATURAL GAS PIPELINE FLOW
METERING STATION
NATURAL GAS FLOW
METER
AMMONIA TANKS (NH3)
SULPHUR DIOXIDE (SO2) HORIZ. TANKS

APPENDIX F

PARCEL DESCRIPTION AND OWNERSHIP INFORMATION

Property descriptions were obtained from the Clark County Assessor's Office. The legal descriptions of the property were obtained by indicating the following information to the Assessor personnel:

- o Property owner and year of transaction; and
- o "Official Book of Records" number and "Instrument Number".

Individuals interested in viewing/obtaining property descriptions can do so at the Clark County Assessor's Office. The Assessor's Office is located at:

309 S. 3rd Street, Fourth Floor
Las Vegas, Nevada 89101

Phone No: (702) 455-3883

The property descriptions for Kerr-McGee Chemical Corporation are contained in Books 57 and/or 68, Instrument No. 389974; Book 349, Instrument No. 282224; and Book 70, Instrument No. 405819 (Reference Doc. K142, K262).

The following sections contain the Historic Summary (F1) and the Current Assessor's Detail (F2).

INDEX

HENDERSON PLANT RIGHTS OF WAY AND EASEMENTS

EASEMENTS GRANTED BY OR EXISTING ON AMERICAN POTASH & CHEMICAL CORPORATIONS HOLDINGS

PARTY NO.	FROM	TO	PURPOSE
XR 1101	Colorado River Commission	Colorado River Commission	To maintain, operate, repair, or replace electrical power transm
XR 1102	Western Electrochemical Company	Arrowhead Lime & Chemical Co.	For ingress and egress to Arrowhead property along access
XR 1103	American Potash & Chemical Corp.	City of Henderson	To construct, maintain, and repair sewage lines.
XR 1104	Western Electro Chemical Co.	Southern Nevada Power Co.	To erect, operate, and maintain electrical transmission line
XR 1105	Western Electro Chemical Co.	Dept. of the Navy	Access to and from USN facilities.
XR 1106	State of Nevada	Southern Nevada Power Co.	To construct, operate, and maintain electric power lines
XR 1107	Reconstruction Finance Corp.	Reconstruction Finance Corp.	To erect, operate, and maintain electrical transmission line
XR 1108	American Potash & Chemical Corp.	Amargosa Valley Cooperative, Inc.	To construct, locate, operate and maintain an electric trans together with poles, towers, crossarms, cables, wires, for said electric transmission line for the purpose only of electric power from the Bureau of Reclamation generating st to Co-op's members in Amargosa Valley, Nevada.

INDEX

HENDERSON PLANT — RIGHTS OF WAY AND EASEMENTS

EASEMENTS GRANTED BY OR EXISTING ON AMERICAN POTASH & CHEMICAL CORPORATIONS HOLDINGS

	TO	PURPOSE	DATE	PAGE
	Colorado River Commission	To maintain, operate, repair, or replace electrical power transmission lines.	Aug. 1, 1952	EB 1101
pany	Arrowhead Lime & Chemical Co.	For ingress and egress to Arrowhead property along avenue G.	Jan. 21, 1953	EB 1102
l Corp.	City of Henderson	To construct, maintain, and repair sewage lines.	Aug. 23, 1956	EB 1103
Co.	Southern Nevada Power Co.	To erect, operate, and maintain electrical transmission lines.	Nov. 21, 1955	EB 1104
).	Dept. of the Navy	Access to and from USN facilities.	May 19, 1951	EB 1105
	Southern Nevada Power Co.	To construct, operate, and maintain electric power lines	Aug. 26, 1950	EB 1106
rp.	Reconstruction Finance Corp.	To erect, operate, and maintain electrical transmission lines	June 3, 1949	EB 1107
Corp.	Amargosa Valley Cooperative, Inc.	To construct, locate, operate and maintain an electric transmission line, together with poles, towers, crossarms, cables, wires, guys and supports for said electric transmission line for the purpose only of transmitting electric power from the Bureau of Reclamation Substation at Henderson, Nevada to Co-op's members in Amargosa Valley, Nevada.	February 14, 1963	EB 1108

NAME OF PROPERTY

HENDERSON PLANT

OWNER AMERICAN POTASH & CHEMICAL CORPORATION OWNER OF RECORD

STATE	COUNTY	DISTRICT	SECTION NUMBER	TOWNSHIP	RANGE	MERIDIAN	LOCATION	DATE O-
Nevada	Clark		Section 12 and 13	T 22 S	R 62 E	MDM		

DATE APPL. SURVEY	SURVEY NO	U. S. MINERAL SURVEYOR	DATE APPL. SURVEY	SURVEYOR GENERAL	SURVEY REC'D	DATE APPL. MIN. LOCN.	SURVEYOR GENERAL	SURVEY NO	MIN. MON. SET BY	DAT

PATENTEE	DATE OF ISSUANCE	ACREAGE	TYPE OF PROPERTY	MIN. CERT. NO	PATENT NO.	SERIAL NO	GEN. LAND OFF. NO.	DATE RECORDED	BOOK	PAGE
		(159.77) 758.73								

CONVEYANCES

FROM	TO	DATE OF INSTRUMENT	DATE RECORDED	BOOK	PAGE	TYPE OF INSTRUMENT
Reconstruction Finance Corporation	Colorado River Commission	June 3, 1949				Quitclaim Deed
Colorado River Commission	Western Electro Chemical Company	Aug. 1, 1952	Aug. 7, 19[illegible]	[illegible]	[illegible]	Grant Deed
Western Electro Chemical Company	American Potash & Chemical Corporation	June 21, 1954				Merger Agreement

NOTES

CONSIDERATION: $4,963,000 for land, buildings, etc. $11,000 for 1101-A, B, C, and D.

DESCRIPTION: PARCEL A Beginning at the South quarter corner of Section 12, T 22 S, R 62 E, MDM, Thence North 89° 08' 31" East 1278.81 feet along the south line of Section 12 to its intersection with the center line of Fourth Street;
Thence North 0° 51' 29" West 327.71 feet along the center line of Fourth Street to a point;
Thence North 81° 08' 31" East 165.00 feet to a point;
Thence South 8° 51' 29" East 64.50 feet to a point;
Thence North 81° 08' 31" East 56.00 feet to a point;
Thence North 8° 51' 29" West 64.50 feet to a point;
Thence North 81° 08' 31" East 427.00 feet to a point;

PARCEL A (cont.) Thence North 8° 51' 37" West 189.00 feet to a point on the center line of Avenue F;
Thence South 81° 08' 23" West 848.00 feet along the center line of Avenue F to its intersection with the Center line of Fourth Street;
Thence North 8° 51' 37" West 3126.72 feet along the center line of Fourth Street to a point on the northerly fence line of B.M.P.;
Thence South 84° 13' 42½" East 1902.78 feet along the northerly fence line of B M P to a point on the north and south center line of Section 12;
Thence South 0° 53' 32½" West 2985.20 feet along the north and south center line of Section 12 to a point;
Thence South 81° 08' 23" West 121.41 feet along a line which is 1.50 feet north of the center line of building columns common to buildings B-1 and B-2;
Thence South 8° 51' 37" East 108.50 feet to a point;
Thence North 81° 08' 23" East 0.13 feet to a point;
Thence South 8° 51' 37" West 144.00 feet to a point on the north face of a concrete retaining wall;
Thence North 81° 08' 23" East 77.69 feet to a point on the north and south center line of Section 12;
Thence South 0° 53' 32½" West 189.18 feet to the south quarter point of Section 12 (which is the point of beginning), containing 5,358,019 square feet or 123.00 acres, more or less, all of which lies in the West Half of said Section 12,

EXCEPTING THEREFROM those certain lands already conveyed under deed dated June 20, 1951, from the above named grantor to the above named Grantee, which deed is on file as Instrument No. 377 in Book 65 at Page 353 of deeds in the office of County Recorder of Clark County, Nevada.

PARCEL B Beginning at the North quarter corner of Section 13, T 22 S, R 62 E, MDM,
Thence South 0° 05' 03" East 528.98 feet to a point;
Thence South 81° 08' 23" East 22.73 feet to a point;
Thence South 8° 51' 37" East 29.00 feet to a point;
Thence South 81° 08' 23" East 341.00 feet to a point;
Thence North 8° 51' 37" West 65.00 feet to a point;
Thence South 81° 08' 23" East 362.00 feet to a point;
Thence South 8° 51' 37" East 234.00 feet to a point;
Thence North 81° 08' 23" East 362.00 feet to a point;
Thence North 8° 51' 37" West 49.00 feet to a point;
Thence North 81° 08' 23" East 340.27 feet to a point;
Thence South 0° 05' 03" West 1905.17 feet to a point on the center line of B M P Highway;
Thence South 81° 08' 23" East 118.05 feet to a point;
Thence North 8° 51' 37" East 1591.50 feet to a point on the center line of Avenue J;
Thence South 81° 08' 23" East 740.00 feet to a point on the center line of Fourth Street;
Thence North 8° 51' 37" East 508.50 feet along the center line of Fourth Street to a point on the center line of Avenue H;
Thence North 81° 08' 23" East 355.0 feet along the center line of Avenue H to a point on the center line of Fifth Street;
Thence North 8° 51' 37" West 555.0 feet along the center line of Fifth Street to a point on the center line of Avenue G;
Thence South 81° 08' 23" West 355.0 feet along the center line of Avenue G to a point on the center line of Fourth Street;
Thence North 8° 51' 37" West 11,727 feet along the center line of Fourth Street to a point on the North line of Section 13;
Thence South 89° 00' 41" East 1278.82 feet along the north line of Section 13 to the north quarter point, which is the point of beginning, containing 1,340,046 square feet or 30.76 acres, more or less, all of which lies in the Northwest quarter of said Section 13.

HENDERSON PLANT

AMERICAN POTASH & CHEMICAL CORPORATION

Formerly
Pote

PARCEL C Beginning at the North quarter corner of Section 13, T 22 S., R 62 E, MIM,
Thence South 88° 59' 59" east 1456.55 feet along the north line of Section 13 to a point on the center line of Eleventh Street;
Thence South 8° 51' 37" east 637.87 feet along the center line of Eleventh Street;
Thence South 81° 08' 23" west 40.0 feet to west boundary of eleventh Street;
Thence North 8° 51' 37" west 335.15 feet to a point;
Thence South 81° 08' 23" West 240.0 feet to a point;
Thence North 8° 51' 37" west 65.0 feet to a point;
Thence South 81° 08' 23" west 34.0 feet to a point;
Thence North 8° 51' 37" West 6.0 feet to a point;
Thence South 81° 08' 23" west 12.0 feet to a point
Thence South 8° 51' 37" East 6.0 feet to a point;
Thence South 81° 08' 23" west 64.0 feet to a point;
Thence South 8° 51' 37" east 1.5 feet to a point;
Thence South 81° 08' 23" west 212.0 feet to a point;
Thence South 8° 51' 37" east 61.5 feet to a point;
Thence South 81° 08' 23" west 903.0 feet to a point;
Thence North 8° 51' 37" west 29.0 feet to a point;
Thence South 81° 08' 23" West 12.27 fe t to a point on the north and south center line of Section 13;
Thence North 0° 05' 03" East 578.98 feet along the north and south center line of Section 13 to the point of beginning, containing 622.187 square feet or 14.28 acres, more or less, all of which lies in the Northeast quarter of Section 13,
AND, beginning at the Northeast corner of Section 13, T 22 S, R 62 E, MIM, thence South 76° 34' 05" West 2727.32 feet to a point on the north and south center line of Section 13, which point to the true point of beginning;
Thence North 81° 08' 23" East 350.73 fe t to a point on the west boundary of 81 hth Street;
Thence North 8° 51' 37" west 120.0 feet to a point;
Thence North 81° 08' 23" east 40.0 feet to a point on the east boundary of Eighth Street;
Thence South 8° 51' 37" East 120.0 feet to a point;
Thence North 81° 08' 23" east 350.0 feet to a point;
Thence South 8° 51' 37" east 215.75 feet to a point;
Thence North 81° 08' 23" East 637.0 feet to a point;
Thence South 8° 51' 37" East 126.25 feet to a point;
Thence South 81° 08' 23" West 454.0 feet to a point;
Thence South 8° 51' 37" East 212.5 feet to a point on the north boundary of Avenue L;
Thence North 81° 08' 23" East 454.0 feet to a point;
Thence South 8° 51' 37" East 40.0 feet to a point on the south boundary of Avenue L;
Thence South 81° 08' 23" West 454.0 feet to a point;
Thence South 8° 51' 37" East 1167.5 feet to a point on the north boundary of B N P Highway;
Thence North 81° 08' 23" east 454.0 feet to a point;
Thence South 8° 51' 37" East 200.0 feet to a point on the south boundary of B N P Highway;
Thence South 81° 08' 23" West 554.0 feet to a point;
Thence North 8° 51' 37" West 100.0 feet to a point;

PARCEL C (Cont.) Thence South 81° 08' 23" West 1119.94 feet along the center line of B M P Highway to a point; Thence North 0° 05' 03" East 1905.17 feet along the north and south center line of Section 13 to the true point of beginning, containing 560,944 square feet or 12.88 acres (49.56 acres Land Office calculation), more or less, all of which lies in the Northeast quarter of said Section 13.

This parcel is subject to the following easements:

(a) Easements granted to United States Bureau of Reclamation by Colorado River Commission in 1949, for transmission lines.
(b) An easement area 17.0 feet wide, being all of that area lying within eight and one-half feet of the center lines of railroad tracks #12 and #13.
(c) That portion lying within the boundaries of B M P Highway is reserved as a highway for access by the public to Basic Magnesium Project.

PARCEL D Beginning at the South quarter corner of Section 12, T 22 S, R 62 E, MDM, thence North 0° 53' 32½" East along the north and south center line of Section 12 a distance of 189.18 feet to a point;

Thence North 81° 08' 23" East 597.98 feet to a point;
Thence North 8° 51' 37" West 490.50 feet to a point;
Thence South 81° 08' 23" West 300.00 feet to a point;
Thence South 8° 51' 37" East 238.00 feet to a point; S. E.
Thence South 81° 08' 23" West 254.59 feet to a point on the north and south center line of Section 12 (said course being along a line which is 1.50 feet northerly from the center line of columns common to Buildings B-1 and B-2);
Thence North 0° 53' 32½" East along the north and south center line of Section 12 a distance of 2985.2 feet to a point on the northerly fence line of B M P;
Thence South 84° 13' 42½" East 536.47 feet along the northerly fence line of B M P;
Thence South 63° 16' 20½" East 411.74 feet along the northerly fence line of B M P;
Thence South 8° 51' 37" East 3255.31 feet along the center line of Eleventh Street to its intersection with the south line of Section 12;
Thence North 88° 59' 59½" West along the south line of Section 12 a distance of 1456.55 feet to the point of beginning, containing 3,410,838 square feet or 85.19 acres, more or less, all of which lies in the East half of said Section 12.
Excepting therefrom those certain lands already conveyed under deed dated June 28, 1951, from the above named Grantor to the above named Grantee, which deed is on file as Instrument N at Page 353 of deeds in the office of County Recorder of Clark County, Nevada.

SUBJECT TO: There is expressly reserved unto RECONSTRUCTION FINANCE CORPORATION, its successors and assigns, all minerals and all mineral rights which may be located upon or under the real pro,er described, together with the right to enter upon, prospect from, mine and remove such minerals; provided, however, that any development of the property for mineral purposes shall be c a manner as to not unreasonably interfere with the use of this property.

Furthermore, the Grantor does hereby reserve unto himself, his successors and assigns, an easement over the following areas for the purpose of allowing the Grantor, his successors and to maintain in place and to operate, repair and/or replace the existing electrical power transmission lines, electric circuits, pipe lines, conduits, tunnels, railroads, steam lines a lines. This easement reserved is for the stated limited purposes only and shall not be extended to the general public, nor shall the Grantee, its successors or assigns, be prohibited any fence or other structure upon the easement areas as long as said areas remain accessible to the Grantor, its successors and assigns, for the limited purposes above stated. Said e easement areas shall be as shown by the map attached hereto and by this reference made a part hereof, which easements are more particularly described as follows:

Twenty foot wide easements:

1. East half of Fourth Street.
2. East half of Fifth Street between center lines of Avenue G and Avenue H.
3. West half of Eleventh Street for a distance of 1675 feet northerly from its intersection with the center line of Avenue H.
4. East half of Eleventh Street for a distance of 433.75 feet southerly from its intersection with the center line of Avenue H.
5. North half of Avenue F.
6. South half of Avenue F from the center line of Eleventh Street to a point 1847 feet westerly therefrom.
7. North half of Avenue G from center line of Fourth Street to the center line of Ninth Street. (Compare grant of easement 3-8-51, between U. S. Lime Corp. and State of Nevada).

Twenty-five foot wide easements:

That area lying westerly from and adjacent to the center line of Ninth Street between the center line of Avenue F and the center line of Avenue G. (See grant of easement of 3-8-51 by State of Nevada to U. S. Lime Corp.).

Sixty foot wide easement:

That area lying northerly from and adjacent to the north boundary of Avenue G between points lying 274 feet and 697 feet westerly from the center line of Ninth Street.

One hundred foot wide easement:

The north half of B M F entrance highway for distances 553 feet easterly and 785 feet westerly from the center line of Eighth Street.

Fifteen foot wide easements:

This is the area lying five feet northerly and ten feet southerly from a line parallel to and twenty-one feet southerly from the center line of Avenue H between the center line of Fourth Street and a point 2381 feet easterly therefrom.

Seventeen foot wide easement:

This is the area lying five feet northerly and twelve feet southerly from a line parallel to and twenty-one feet southerly from the center line of AvenueH, from the center line of Eleventh Street to a point 314 feet westerly therefrom.

Seventeen foot wide easements:

Those areas are those lying within eight feet six inches from the center lines of the following railroad tracks:

#5, 5B, 6, 8A, 10, 11, 12, and 13.

HENDERSON PLANT

AMERICAN POTASH & CHEMICAL CORPORATION

on the West boundary of Eleventh Street projected; thence South 8° 51' 37" East 767.34 feet along said West boundary to a point on the North fence line of B.MP; thence leaving said West 387.59 feet along said North fence line to an angle point thereing thence continuing along said fence line North 84° 13' 42.5" West 3118.39 feet to the West line of Section 12; thence S along said West line to the point of beginning, containing 151.3689 acres, more or less.

PARCEL NO. 2
Beginning at the Southwest corner of Section 12, Township 22 South, Range 62 East Mt. Diablo Base and meridian; thence North 51° 52' 46.5" East 1571.58 feet to the true point of beginni Thence North 8° 51' 37" West 2635.00 feet to a point on the North fence line of Basic Magnesium Plant; thence South 84° 13' 42.5" East 2418.12 feet along said fence line to an angle poi said fence line South 63° 17' 49" East 387.59 feet to a point on the West line of Eleventh Street projected; thence South 8° 51' 37" East 1798.74 feet along said West line to a point f Section 12 bears South 44° 25' 17" East 2059.78 feet; thence South 81° 08' 23" West 2654.99 feet to the true point of beginning, containing 138.9621 acres more or less.

TOGETHER WITH all of the Government's rights, title and interest in and to that certain easement granted by Stauffer Chemical Company of Nevada, a Nevada Corporation, to the United State dated December 10, 1952, recorded May 27, 1953, as document No. 405819, in Book 70 of Deeds, at page 386, Official Records of Clark County, Nevada.

SUBJECT TO rights of way, restrictions, reservations and easements existing or of record.

SUBJECT TO covenants, restrictions, conditions and reservations of a NATIONAL SECURITY CLAUSE.

CEPTIONS: UNITED STATES OF AMERICA: Reservations in patent from the United States of America, recorded October 24, 1941 in Book 29 of Deeds, page 129, Clark County, Nevada records, as follows: "reserving, however, to the United States all oil, coal, or other mineral any time found in said lands, together with the rights to prospect for, mine and remo conditions and under such rules and regulations as the Secretary of the Interior may prescribe."

STATE OF NEVADA: Reservations in patents from the State of Nevada, as follows: "Provided that all mines of gold, silver, copper, lead, cinnabar and other valuable minerals which may exist in the said tract, except gas, coal, oil and oil

SOUTHERN NEVADA POWER COMPANY: An easement over a portion of Section 12, Township 22 South, Range 62 East, (as indicated on the map of Easement areas for Electrical lines of Southern Ne being Issue No. 2 of map U-135), for pole lines and incidental purposes, as granted to Southern Nevada Power Co., by instrument recorded October 10, 1950 as Nevada records.

NAME OF PROPERTY

HENDERSON PLANT

OWNER AMERICAN POTASH & CHEMICAL CORPORATION OWNER OF RECORD

STATE	COUNTY	DISTRICT	SECTION NUMBER	TOWNSHIP	RANGE	MERIDIAN	LOCATOR
Nevada	Clark		Sections 1 and 12	T 22 S	R 62 E	MDM	

DATE APPL. SURVEY	SURVEY NO	U S MINERAL SURVEYOR	DATE APPL. SURVEY	SURVEYOR GENERAL	SURVEY TIE IN	DATE APPL. MIN. MON	SURVEYOR GENERAL	SURVEY NO.	MIN MON. TIE IN

PATENTEE	DATE OF ISSUANCE	ACREAGE	TYPE OF PROPERTY	MIN. CERT. No	PATENT No.	SERIAL No.	GEN LAND Off. No.	DATE RECORDED	BOOK	PAGE
		290.331 A.								

CONVEYANCES

FROM	TO	DATE OF INSTRUMENT	DATE RECORDED	BOOK	PAGE	TYPE OF INSTRUMENT
				Official Special Records Book 349	Instrument 282224	
United States of America	American Potash & Chemical Corporation	March 15, 1962	March 23, 1962			Quitclaim Deed

NOTES

DESCRIPTION: All that certain property being a portion of what is commonly known as the Basic Magnesium Project in the County of Clark, State of Nevada, and more particularly described as follows:

PARCEL NO. 1

Beginning at the Section corner common to Sections 1, 2, 11 and 12, Township 22 South, Range 62 East, M.D.B.&M.; thence North 1° 16' 15" West 1314.14 feet along the West line of Section 1; thence leaving said West line South 89° 36' 55" East 1252.59 feet more or less to the Southwesterly line of Athol Avenue as shown on the Plat of Sierra Vista City, recorded in Book 2 of Plats, page 5, Clark County, Nevada records; thence South 42° 27' 00" East 41.39 feet along saidSouthwesterly line; thence leaving said Southwesterly line South 0° 47' 53" East 1285.42 feet to a point on the South line of said Section 1; thence South 89° 31' 45" East 1269.30 feet along said South line to the Quarter corner common to said Sections 1 and 12; thence leaving said South line South 0° 53' 32.5" West 1317.21 feet; thence South 89° 33' 08" East 753.00 feet to a point

HENDERSON PLANT

AMERICAN POTASH & CHEMICAL CORPORATION

PARCEL NO. 5 (Unit 4 in Section 13)

Beginning at the Northeast Corner of Section 13, T 22 S and R 62 E of MDBM; thence North 88° 59' 59.5" West along the North line of said Section 13 a distance of 2007.56 feet to a point, said point being the true point of beginning; thence North 88° 59' 59.5" West along the North line of said Section 13 a distance of 355.25 feet to a point; thence South 8° 51' 37" East a distance of 7.01 feet to a point; thence North 81° 08' 23" east a distance of 350.00 feet to a point; thence North 8° 51' 37" West a distance of 298.18 feet to the true point of beginning, containing 50808.25 square feet or 2.640 Acres more or less, all of which lies in the Northeast one quarter of Section 13, T 22 S and R 62 E of MDBM.

PARCEL NO. 6 (Office Bldg. K-36 Area)

Beginning at the Northeast Corner of Section 13, T 22 S, R 62 E, MDBM, thence South 63° 53'13" West 992.57 feet to a point said point being the true point of beginning; thence South 8° 51' 37" East 160.00 feet to a point; thence South 81° 08' 23" West 210.00 feet to a point; thence North 8° 51' 37" West 160.00 feet to a point; thence North 81° 08' 23" east 210.00 feet to the point of true beginning, containing 33,600.0 square feet or 0.771 acres more or less, all of which lie in the Northeast 1/4 of said Section 13.

PARCEL NO. 7 (Change House S 2, South 1/2)

Beginning at the Northeast Corner of Section 13, T22S, R62E, MDBM, thence South 79° 34' 01" West, 2202.41 feet to a point, said point being the true point of beginning; thence South 8° 51' 37" East 36.00 feet to a point; thence South 81° 08' 23" West 126.33 feet to a point; thence North 8° 51' 37" East 36.00 feet to a point; thence North 81° 08' 23" east 126.33 feet to the point of true beginning, containing 4547.88 square feet or 0.104 acres more or less, all of which lie in the Northeast 1/4 of said Section 13.

PARCEL NO. 8 (Storage Yard Between Tr. 11 & 12 and 8th & 9th St.)

Beginning at the Northeast Corner of Section 13, T 22 S, R 62 E, MDBM thence South 77° 42' 52" West 1981.45 feet to a point said point being the true point of beginning; thence South 8° 51' 37" East 391.00 feet to a point; thence South 81° 08' 23" West 350.00 feet to a point; thence North 8° 51' 37" West 391.00 feet to a point; thence North 81° 08' 23" East 350.00 feet to the point of true beginning, containing 136,850.00 square feet or 3.142 Acres more or less, all of which lies in the Northeast 1/4 of said Section 13; except easement for ingress and egress for maintenance of utilities, overhead power lines and supporting towers, electric control tunnel, electric ducts, grounding cables, steam line trench, water lines and manholes for access to underground structures, as now existing on tract as shown but not necessarily limited to only those shown on Drawing H-518.

HENDERSON PLANT

AMERICAN POTASH & CHEMICAL CORPORATION

A portion of the lands herein conveyed are subject to that certain war reservation clause,, known as paragraph Eight, beginning Page 9, of that certain lease dated February 1, 1946, by and between RECONSTRUCTION FINANCE CORPORATION and WESTERN ELECTROCHEMICAL COMPANY, said lease being on file in the office of the County Recorder of Clark County, Nevada, as Instrument No. 281366.

Together with the appurtences thereunto belonging, and all buildings, improvements, equipment, fixtures, and personal property thereon situated or belonging thereto.

The above mentioned portions subject to the war reservation clause are more particularly described as follows:

PARCEL NO. 1 (Salt Storage Building)

Beginning at the Southeast Corner of Section 12, T 22 S, and R 62 E of Mount Idaho Base and Meridian, thence North 78° 07' 26" West a distance of 2932.90 feet to a point, said point being the true point of beginning; thence South 81° 08' 23" West a distance of 257.00 feet to a point; thence North 8° 51' 37" West a distance of 95.17 feet to a point; thence North 81° 08' 23" East a distance of 257.00 feet to a point; thence South 8° 51' 37" East a distance of 95.17 feet to the true point of beginning, containing 24458.69 square feet or 0.561 acres more or less all of which lies in the Southwest one quarter of Section 12 T 22 S and R 62 E of MDM.

PARCEL NO. 2 (Acid Tank Neut. Area)

Beginning at the Southeast Corner of Section 12, T 22 S and R 62 E; thence North 75° 16' 31" West a distance of 1997.26 feet to a point, said point being the true point of beginning; thence South 81° 08' 23" West a distance of 58.41 feet to a point; thence North 8° 51' 37" West a distance of 24.00 feet to a point; thence North 81° 08' 23" East a distance of 58.41 feet to a point; thence South 8° 51' 37" East a distance of 24.00 feet to the true point of beginning, containing 1401.84 square feet or 0.032 Acres more or less, all of which lies in the Southeast one quarter of Section 12, T 22 S and R 62 E of MDM.

PARCEL NO. 3 (R.R. Unloading Platform)

Beginning at the Southeast Corner of Section 12 T 22 S and R 62 E of MDM; thence North 81° 49' 17" West a distance of 2068.62 feet to a point, said point being the true point of beginning; thence South 81° 08' 23" West a distance of 260.00 feet to a point; thence North 8° 51' 37" West a distance of 13.00 feet to a point; thence North 81° 08' 23" East a distance of 260.00 feet to a point; thence South 8° 51' 37" East a distance of 13.00 feet to the true point of beginning, containing 3380.00 square feet or 0.078 Acres more or less, all of which lies in the Southeast one quarter of Section 12, T 22 S and R 62 E of MDM.

PARCEL NO. 4 (Unit 4 in Section 12)

Beginning at the Southeast Corner of Section 12, T 22 S and R 62 E of MDM; thence North 88° 59'59.5" West along the South line of said Section 12 a distance of 2007.56 feet to a point, said point being the true point of beginning; thence North 88° 59' 59.5" West along the South line of said Section 12 a distance of 355.25 feet to a point; thence North 8° 51' 37" West a distance of 130.99 feet to a point; thence North 81° 08' 23" East a distance of 350.00 feet to a point; thence South 8° 51' 37" East a distance of 191.82 feet to the true point of beginning containing 56491.75 square feet or 1.297 Acres more or less, all of which lies in the Southeast one quarter of Section 12, T 22 S and R 62 E of MDMeridM.

PCL 210-090-001 TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
AMERICAN POTASH & CHEMICAL CORP PT N2 SEC 12 22 62

DOCUMENT- 0349:0282224 03/23/62 1 NS
ACRES- 9.25
GEOID- PT SW4 NE4 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT- INITIAL

This record is for assessment use only.

No liability is assumed to its accuracy.

PCL 210-090-003 TAX DISTRICT- 525 ----- ASSESSOR DESCRIPTION -----
AMERICAN POTASH & CHEMICAL CORP PT S2 NE4 SEC 12 22 62

DOCUMENT- 0349:0202224 03/23/62 1 NS
ACRES- 10.70
GEOID- PT SW4 NE4 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT- INITIAL

This record is for assessment use only.

No liability is assumed for the accuracy

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[illegible] TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
AMERICAN POTASH & CHEMICAL CORP PT S2 NW4 SEC 12 22 62

DOCUMENT- 0349:0202224 03/23/62 1 NS
ACRES- 35.23
GEOID- PT S2 NW4 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT - INITIAL

This record is for assessment use only.

No liability is assumed to its accuracy.

RIPTION

AMERICAN POTASH & CHEMICAL CORP PI N2 SEC 12 22 62

DOCUMENT- 0349:0202224 03/23/62 1 MS
ACRES- 26.90
GEOID- PI S2 NW4 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT- INITIAL

This record is for assessment purposes only

No liability is assumed as to its accuracy.

PCL 210-000--001 TAX DISTRICT-- 525 ------ ASSESSOR DESCRIPTION ------
AMERICAN POTASH & CHEMICAL CORP PI N2 SEC 12 22 62

DOCUMENT-- 0349:0202224 03/23/62 1 NS
ACRES-- 77.50
GEOID-- ALL N2 NW4 SEC 12 22 62
UPDATE-- S-999-999-72 12/03/71 LAST- 07/11/92
COMMENT-- INITIAL

This record is for assessment use only.

No liability is assumed to its accuracy.

PCL 210-070-001 TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
AMERICAN POTASH & CHEMICAL CORP SW4 SW4 SEC 01 22 62

DOCUMENT- 0349:0202224 03/23/62 1 NS
ACRES- 38.71
GEOID- ALL SW4 SW4 SEC 01 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/29/92
COMMENT- INITIAL

This record is for assessment use only.

No liability is assumed to its accuracy.

PCL 210-100-001 TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
AMERICAN POTASH & CHEMICAL CORP PT N2 SE4 SEC 12 22 62

DOCUMENT- 0349:0282224 03/23/62 1 NS
ACRES- 32.00
GEOID- PT NW4 SE4 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 11/06/92
COMMENT- INITIAL

This record is for assessment use only

No liability is assumed as to the accuracy

PCL 210-130-002 TAX DISTRICT- 525 ----- ASSESSOR DESCRIPTION -----
AMERICAN POTASH & CHEMICAL CORP PI N2 SEC 12 22 62

DOCUMENT- 0349:0202224 03/23/62 1 NS
ACRES- 40.62
GEOID- PI N2 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT- INITIAL

PCL 210-120-004 TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
AMERICAN POTASH & CHEMICAL CORP P1 S2 SW4 SEC 12 22 62

DOCUMENT- 0340;0202224 03/23/62 1 MS
ACRES- 11.46
GEOID- P1 S2 SW4 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT- INITIAL

This record is for assessment use only.

No liability is assumed to its accuracy.

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PCL  210-120-005            TAX DISTRICT- 525    ----- ASSESSOR DESCRIPTION -----
KERR MCGEE CHEMICAL CORP                         PT S2 SW4        SEC 12 22 62

DOCUMENT- 9999;9999999 02/02/68 1     NS
ACRES-     13.97
GEOID- PT S2 SW4 SEC 12 22 62
UPDATE-  A-171-249-77 07/20/76 LAST- 10/16/92
COMMENT- 066;385431
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
PARCEL-  210-120-005      INACTIVE- 013  DOCUMENT- 9999;9999999 02/02/68
KERR MCGEE CHEMICAL CORP                        TAX DIST- 520  ACRES-     13.97
                                                GEOID-
COMM-  .19AC TO 210-110-007                           UPD- S-021-022-73 01/27/72
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - LAST UPDT  06/28/74
PARCEL-  210-120-005      INACTIVE- 005  DOCUMENT- 0000;0000000
AMERICAN POTASH & CHEMICAL CORP                 TAX DIST- 520  ACRES-     14.16
                                                GEOID-
COMM-  INITIAL                                        UPD- S-999-999-72 12/03/71
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - LAST UPDT- 12/03/71
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This record is for [illegible] only.

No liability is assumed to its accuracy.

T

IPTION -----
12 22 62

DOCUMENT- [illegible]
ACRES- 2.83
GEOID- PT SE4 SW4 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT- INITIAL

This record is for assessment use only.

No liability is assumed to its accuracy.

KMC DR
04-0008878

T

ION ------
22 62

DOCUMENT- 9999;9999999 99/99/99 1 NS
ACRES- 1.46
GEOID- PT S2 S2 SEC 12 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/16/92
COMMENT- INITIAL

No liability is assumed to its accuracy.

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PCL  210-120-010          TAX DISTRICT- 525    ----- ASSESSOR DESCRIPTION -----
KERR MCGEE CHEMICAL CORP                       PT S2 SW4        SEC 12 22 62

DOCUMENT- 9999;9999999 02/02/60 I     NS
ACRES-      9.82
GEOID- PT S2 SW4 SEC 12 22 62
UPDATE-  A-171-249-77 07/20/76 LAST- 10/16/92
COMMENT- 066;385431
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
PARCEL-  210-120-010     INACTIVE- 013  DOCUMENT- 9999;9999999 02/02/60
KERR MCGEE CHEMICAL CORP                      TAX DIST- 520  ACRES-      9.82
                                              GEOID-
COMM-  .20AC TO 210-110-007                          UPD- S-021-022-73 01/27/72
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - LAST UPDT- 06/28/74
PARCEL-  210-120-010     INACTIVE- 005  DOCUMENT- 0000;0000000
AMERICAN POTASH & CHEMICAL CORP               TAX DIST- 520  ACRES-     10.02
                                              GEOID-
COMM-  INITIAL                                       UPD- S-999-999-72 12/03/71
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - LAST UPDT- 12/03/71
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This record is for assessment use only.

No liability is assumed to its accuracy.

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PCL  210-120-012            TAX DISTRICT- 525    ------ ASSESSOR DESCRIPTION ------
KERR MCGEE CHEMICAL CORP                         PT SE4 SW4 SEC 12 22 62

DOCUMENT- 9999:9999999 02/02/68 1     NS
ACRES-      1.61
GEOID- PT SE4 SW4 SEC 12 22 62
UPDATE-  S-072-421-90 11/23/88 LAST- 10/16/92
COMMENT-
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
PARCEL-  210-120-008      INACTIVE- 037  DOCUMENT- 9999:9999999 02/02/68 1     NS
KERR MCGEE CHEMICAL CORP                         TAX DIST- 526  ACRES-     1.70
                                                 GEOID- PT SE4 SW4 SEC 12 22 62
COMM-  066:385431                                      UPD- S-130-133-76 08/20/75
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - LAST UPDT- 08/24/88
PARCEL-  210-120-008      INACTIVE- 029  DOCUMENT- 9999:9999999 02/02/68
KERR MCGEE CHEMICAL CORP                         TAX DIST- 520  ACRES-     1.70
                                                 GEOID-
COMM-  3.10 AC TO 21-11-07                             UPD- S-094-096-74 09/12/73
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - LAST UPDT- 10/04/74
PARCEL-  210-120-008      INACTIVE- 021  DOCUMENT- 9999:9999999 02/02/68
AMERICAN POTASH & CHEMICAL CORP                  TAX DIST- 520  ACRES-     1.70
                                                 GEOID-
COMM-  3.10 AC TO 21-11-07                             UPD- S-152-172-74 10/19/72
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - LAST UPDT- 07/30/73
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This record is for assessment use only.

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PARCEL- 210-120-008 INACTIVE- 013 DOCUMENT- 9999;9999999 02/02/60
KERR MCGEE CHEMICAL CORP TAX DIST- 520 ACRES- 1.70
GEOID-
COMM- 3.18 AC TO 21-11-07 UPD- S-021-022-73 01/27/72
LAST UPDT- 01/27/72
PARCEL- 210-120-008 INACTIVE- 005 DOCUMENT- 0000;0000000
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GEOID-
COMM- INITIAL UPD- S-999-999-72 12/03/71
LAST UPDT- 12/03/71
PCL 210-120-013 TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
CHEMSTAR INC PT SE4 SW4 SEC 12 22 62

DOCUMENT- BR1010:00062 10/10/80 I NS
ACRES- .09
GEOID- PT SE4 SW4 SEC 12 22 62
UPDATE- S-072-421-90 11/23/80 LAST- 01/12/93
COMMENT-

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GEOID- PT SE4 SW4 SEC 12 22 62
COMM- 066:305411 UPD- S-130-133-76 08/20/76
LAST UPDT- 08/24/00
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GEOID-
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LAST UPDT- 10/04/74
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GEOID-
COMM- 3.18 AC TO 21-11-07 UPD- S-152-172-73 10/19/72
LAST UPDT- 07/30/73

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DOCUMENT- 861229:00376 12/29/86 1     NS
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GEOID- PT S2 S2 SEC 12 22 62
UPDATE-  A-088-147-89 04/14/87 LAST- 01/12/93
COMMENT- CERT OF AMND-870409:087
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FLINTKOTE CO                                      TAX DIST- 525  ACRES-      5.00
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RIPTION -----

KERR MCGEE CHEMICAL CORP PT S2 SE4 SEC 12 22 62

DOCUMENT- 9999:9999999 02/02/60 I NS
ACRES- 33.17
GEOID- PT S2 SE4 SEC 12 22 62
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COMMENT- 066:305431

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GEOID-
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LAST UPDT- 06/20/74

PARCEL- 210-110-002 INACTIVE- 005 DOCUMENT- 0000:0000000
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GEOID-
COMM- INITIAL UPD- S-999-999-72 12/03/71
LAST UPDT- 12/03/71

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PCL 210-460-001 TAX DISTRICT- 526 ------ ASSESSOR DESCRIPTION ------
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UPDATE- S-999-999-72 12/03/71 LAST- 10/23/92
COMMENT- 067:389974

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PCL 210-420-002 TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
AMERICAN POTASH & CHEMICAL CORP PT N2 NE4 SEC 13 22 62

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ACRES- 14.20
GEOID- PT N2 NE4 SEC 13 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/23/92
COMMENT- 067:389974

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PCL 210-420-004 TAX DISTRICT- 525 ----- ASSESSOR DESCRIPTION -----
AMERICAN POTASH & CHEMICAL CORP PT N2 NE4 SEC 13 22 62

DOCUMENT- 0066:0305431 99/99/99 1 NS
ACRES- 11.06
GEOID- PT N2 NE4 SEC 13 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/23/92
COMMENT- 067:309974

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PCL  210-460-004           TAX DISTRICT- 525    ----- ASSESSOR DESCRIPTION -----
AMERICAN POTASH & CHEMICAL CORP                 PT N2 SEC 13 22 62

DOCUMENT- 0066:0385431 99/99/99 1     NS
ACRES-     20.70
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UPDATE-  S-123-126-76 08/08/75 LAST- 10/23/92
COMMENT- 067:389974
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PCL 210-410-002 TAX DISTRICT- 525 ------ ASSESSOR DESCRIPTION ------
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ACRES- 21.35
GEOID- PT NE4 NW4 SEC 13 22 62
UPDATE- S-999-999-72 12/03/71 LAST- 10/23/92
COMMENT- 067;389974

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Kerr-McGee Chemical LLC

Henderson, Nevada

Conceptual Site Model
Kerr-McGee Facility
Henderson, Nevada

ENSR International

February 2005

Document Number 04020-023-100

Conceptual Site Model
Kerr-McGee Facility, Henderson, Nevada

ENSR Document No. 04020-023-100
February 2005

Prepared for

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Henderson, Nevada

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Conceptual Site Model
Kerr-McGee Facility,
Henderson, Nevada

The undersigned hereby certify that they are responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of their knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.

S M Crowley 2-25-05

Susan M. Crowley, CEM 1428, expires March 2007
Staff Environmental Specialist
Kerr-McGee Chemical LLC

Sally W. Bilodeau 2-25-05

Sally W. Bilodeau
Senior Program Manager, ENSR

2-25-05

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Senior Program Manager, ENSR

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ABBREVIATIONS AND ACRONYMS

µg/kg	micrograms per kilogram
µg/l	micrograms per liter
µS/cm	micro Siemen per centimeter
AP	ammonium perchlorate
AOC	Administrative Order on Consent
AP&CC	American Potash and Chemical Company
AST	above-ground storage tank
ASTM	American Society for Testing and Materials
bgs	below ground surface
BMI	Basic Metals, Inc. also known as Basic Management Inc. and Black Mountain Industrial (Park)
BTEX	benzene, toluene, ethylbenzene, and xylenes
COH	City of Henderson
Cr^{+3} and Cr^{+6}	trivalent chromium, and hexavalent chromium
CMP	Chromium Mitigation Program
CPE	Cross-linked Polyethylene
CSM	Conceptual Site Model
DAF	dilution alternation factor
DMR	Discharge Monitoring Report
DOT	Department of Transportation
ECA	Environmental Conditions Assessment
ECI	Environmental Conditions Investigation
EP	Extraction Procedure
EPA	United States Environmental Protection Agency

ABBREVIATIONS AND ACRONYMS

FBR	Fluidized Bed Reactor
ft^2	square feet
ft/day	feet per day
ft./ft.	foot per foot
gpd/ft^2	gallons per day per square foot
g/m^2	grams per square meter
gpm	gallons per minute
GWTP	groundwater treatment process
Hardesty	Hardesty Chemical Company
HDPE	High Density Polyethylene
ISEP®	Trade name for regeneratable ion exchange system designed by Calgon Carbon
IX	Ion Exchange
Kerr-McGee	Kerr-McGee Chemical LLC
LOU	Letter of Understanding
lbs	pounds
MCL	Maximum Containment Level
mg/kg	milligrams per kilogram
mg/M^3	milligrams per cubic meter
mg/l	milligrams per liter
mil	millimeter
msl	mean sea level
NDEP	Nevada, Division of Environmental Protection
NPDES	National Pollutant Discharge Elimination System
PAH	polynuclear aromatic hydrocarbon
PCB	polychloromated biphenyls

ABBREVIATIONS AND ACRONYMS

Pepcon	Pacific Engineering and Production Company
PQL	practical quantitation limit
PRG	Preliminary Remediation Goal
PVC	polyvinylchloride
RIB	Rapid Infiltration Basins
RCRA	Resource Conservation and Recovery Act
sq. ft.	square feet
SSL	Soil Screening Level
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TCA	trichloroethane
TCLP	Toxicity Characteristic Leachate Procedure
TDS	total dissolved solids
TOC	total organic carbon
TE	Trade Effluent
Tetra Tech	Tetra Tech EM Inc.
TPH	total petroleum hydrocarbons
TSDF	Treatment, Storage, and Disposal Facility
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UV	ultraviolet
VOC	volatile organic compound
WECCO	Western Electrochemical Company

1.0 INTRODUCTION

1.1 Purpose and Scope

The terminology used to describe the Kerr-McGee Chemical LLC Henderson (Kerr-McGee) facility and surrounding environments for this document is as follows: "the Site" refers to the 452-acre facility currently owned and operated by Kerr-McGee and shown on Plate 1 in light blue; "The study area" refers to the area approximately 10,000 feet across in an east-west direction extending from the south boundary of the Site approximately 3 ½ miles north to Las Vegas Wash.

The purpose of the Conceptual Site Model (CSM) is to describe the Site and to document the Site-specific release sources, release mechanisms, transportation pathways, exposure routes and receptors. The CSM was prepared by assessing and summarizing previous environmental work conducted.

The intended use of the CSM is to compile and integrate available Site information and to identify potential data gaps. Furthermore, the CSM is also intended to facilitate the selection of remedial alternatives and to evaluate the effectiveness of remedial actions in reducing the exposure of environmental receptors to contaminants. Lastly, the CSM provides technical and regulatory personnel, as well as members of the public, with a tool to better understand the Site, resolve issues concerning the Site, and facilitate the decision making process.

1.2 Guidance Documents

The CSM for the Kerr-McGee Henderson facility (Site), was developed to provide a framework to evaluate the Site with respect to waste sources, release mechanisms, transportation pathways, exposure routes and receptors. The Site has been used for chemical production since 1942. Environmental investigations relating to the Site have been conducted since 1991. Soil, surface water and groundwater samples have been collected and analyzed from the Site and surrounding areas. These data were used to develop this CSM. As new data are developed, the CSM will continue to be re-evaluated and refined.

Consistent with requests from the Nevada Division of Environmental Protection (NDEP), this report follows the Standard Guide for Developing a Conceptual Site Model for Contaminated Sites [Designation E-1689-95 (re-approved 2003)] by the American Society for Testing and Materials (ASTM). Other guidance documents used in structuring this CSM were:

> United States Environmental Protection Agency (USEPA), 1996, Soil Screening Guidance Users Guide, Attachment A. Conceptual Site Model Summary;

USEPA 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, EPA/540/G-89/004 October 1988; and

USEPA 1989, Risk Assessment Guidance for Superfund for Superfund Volume 1, Human Health Evaluation Manual (Part A) Interim Final December 1989.

1.3 Report Organization

The CSM includes the following nine numbered sections and four appendices:

1.0 Introduction – Discusses the report organization, purpose, scope and intended use of the CSM.

2.0 Site Summary – Provides the physical and hydrogeologic setting of the Site and surrounding area.

3.0 Historical Information – Summarizes the history of Site uses and the extent of previous investigations.

4.0 Source Characterization – Identifies known and potential contaminant sources.

5.0 Migration Pathway Description – Describes known and potential primary and secondary migration and transportation pathways in soil, groundwater, surface water, air and biota.

6.0 Environmental Receptor Identification – Identifies the known and potential on-site and off-site receptors.

7.0 Conceptual Site Model – Presents the conceptual site model based on the information presented in the previous sections.

8.0 Data Gaps – Identifies known and potential data gaps that were encountered during development of the CSM.

9.0 References – Provides a bibliographic citation for each of the references in the report.

Appendix A. Monitoring Well Information and Data Tables – Provides tabulated monitoring well data, including the monitoring well coordinates, elevations, total depth and historical chemical data for on-site wells.

Appendix B. Soil Boring Logs and Well Construction Diagrams – Contains a compact disk with electronic files in portable data format (pdf) of the boring logs and well construction diagrams.

Appendix C. List of Chromium and Perchlorate Reports – Provides a chronological list of reports addressing Site-related chromium and perchlorate assessment and remediation.

Appendix D. Diagrams of Sample Locations from Previous Reports – Provides copies of figures, diagrams and sketches showing where samples were collected. Diagrams are not available for all sites that were samples.

Appendix E. Biologic Resources – Provides lists of plant and animal species known or expected in Las Vegas Wash.

2.0 SITE SUMMARY

2.1 Site Location

The Site is part of the Black Mountain Industrial (BMI) complex, formerly known as Basic Management Inc. (BMI) and Basic Metals Inc. (BMI). The Site is approximately 454 acres in size and is located 13 miles southeast of Las Vegas in an unincorporated section of Clark County, Nevada. It is completely surrounded by the incorporated area comprising the City of Henderson (COH) (Figure 1 and Plate 1). The Site is in Township 22S, Range 62E and covers portions of Sections 1, 12 and 13. The approximate center of the Site is longitude 36°02'45" W and latitude 115°00'20" N.

2.2 Topography

Elevations across the Site range from 1,677 to 1,873 feet above mean sea level. The land surface across the Site slopes toward the north at a gradient of approximately 0.023 foot per foot (ft./ft.). The developed portions of the Site have been modified by grading to accommodate building foundations, surface impoundments and access roads. Off-Site the slope continues to the north where, at Sunset Road, the land surface flattens and slopes at a gradient of 0.011 ft./ft. to Las Vegas Wash. Plate 1 illustrates the site plan and topography.

2.3 Climate

The climate of the Las Vegas Valley is arid, consisting of mild winters and dry hot summers. Average annual precipitation as measured in Las Vegas from 1971 to 2000 is 4.49 inches. Precipitation generally occurs during two periods, December through March and July through September. The winter storms generally produce low intensity rainfall over a large area. The summer storms generally produce a high intensity rainfall over a smaller area for a short duration. These violent summer thunderstorms account for most of the documented floods in the Las Vegas area. Temperatures can rise to 120^{O} F in the summer and average relative humidity is 20 percent. The mean annual evaporation from lake and reservoir surfaces ranges from 60 to 82 inches per year.

Winds frequently blow from the southwest or northwest and are influenced by nearby mountains. Strong winds in excess of 50 miles per hour are experienced occasionally.

2.4 Geology

2.4.1 Regional Geology

The Las Vegas Valley occupies a topographic and structural basin trending northwest-southeast and extending approximately 55 miles from near Indian Springs on the north to Railroad Pass on the south. The valley is bounded by the Las Vegas Range, Sheep Range and Desert Range to the north; by Frenchman and Sunrise Mountains to the east; by the McCullough Range and River Mountains to the south and southeast, and the Spring Mountains to the west. The mountain ranges bounding the east, north and west sides of the valley consist primarily of Paleozoic and Mesozoic sedimentary rocks (limestones, sandstones, siltstones, and fanglomerates), whereas the mountains on the south and southeast consist primarily of Tertiary volcanic rocks (basalts, rhyolites, andesites and related rocks) that lie directly on Precambrian metamorphic and granitic rocks (Bell, 1981).

In the Las Vegas Valley, basin-fill consists of Tertiary and Quaternary sedimentary and volcanic rocks and unconsolidated deposits which can be up to 13,000 feet thick (Langenheim and others, 1998). The valley floor consists of fluvial, paludal (swamp) and playa deposits surrounded by more steeply sloping alluvial fan aprons derived from erosion of the surrounding mountains. Generally, the deposits grade finer with increasing distance from the source area and with decreasing elevation. The structure within the Quaternary and Tertiary-age basin-fill is characterized by a series of generally north-south trending faults scarps. The origin of the faults is somewhat controversial; they may be tectonic in origin or may be the response to compaction and subsidence within the basin due to groundwater withdrawal.

2.4.2 Local Geology

The local geology and hydrology are defined by data collected from the numerous borings and wells that have been installed in the area (Plate 1). Information on the wells, including their coordinates, elevation, total depth and other pertinent information, is presented in Appendix A. Boring logs and well construction diagrams are included as electronic files in Appendix B.

Alluvium. The Site is located on Quaternary age alluvial deposits that slope north toward Las Vegas Wash. The alluvium consists of a reddish brown heterogeneous mixture of well-graded sand and gravel with lesser amounts of silt, clay and caliche. Clasts within the alluvium are primarily composed of volcanic material. Boulders and cobbles are common. Due to their mode of deposition, no distinct beds or units are continuous over the area.

A major feature of the alluvial deposits is the stream-deposited sands and gravels that were laid down within paleochannels that were eroded into the surface of the Muddy Creek formation during infrequent flood runoff periods. These deposits are thickest within the paleochannel boundaries, which are narrow and linear. These sand and gravel deposits exhibit higher

permeability than the adjacent, well-graded deposits. In general, these paleochannels trend northeastward.

The thickness of the alluvial deposits ranges from less than one foot to more than 50 feet beneath the Site. Soil types identified in boreholes on Site include poorly sorted gravel, silty gravel, poorly sorted sand, well-sorted sand and silty sand. The thickness of the alluvium, as well as the surface of the underlying Muddy Creek formation, was mapped to locate these paleochannels. Plate 2 shows the surface of the Muddy Creek formation, whereas Plate 3 shows the thickness distribution of the alluvium. Four east-west and one north-south hydrogeologic cross sections (Plates 4A, 4B, 4C and 4D, respectively) show the spatial relationships between the units.

Muddy Creek Formation. The Muddy Creek formation of Miocene and Pliocene(?) age occurs in Las Vegas Valley as valley-fill deposits that are coarse-grained near mountain fronts and progressively finer-grained toward the center of the valley (Plume, 1989). In the Las Vegas Valley, the Muddy Creek is documented in boring logs to be at least 275 feet thick and is estimated to be at least 1,000 feet thick (Plume 1989).

Where encountered beneath the Site, the Muddy Creek formation is composed of at least two thicker units of fine-grained sediments of clay and silt (the fine-grained facies) interbedded with at least two thinner units of coarse-grained sediments of sand, silt and gravel (the coarse-grained facies). Everywhere beneath the Site, the fine-grained facies separates the coarse-grained facies from the overlying Quaternary alluvium.

The Muddy Creek formation represents deposition in an alluvial apron environment near the mountain borders, grading into fluvial, paludal (swamp), playa and lacustrine environments further out into the valley. On Site, the Muddy Creek does not crop out, but instead subcrops beneath a veneer of Quaternary alluvium. Two miles west of the Site, the Muddy Creek formation's fine-grained facies pinch out and the coarse-grained facies directly underlies the Quaternary alluvium.

In on-Site borings, the contact between the Quaternary alluvium and the Muddy Creek formation is typically marked by the appearance of a well-compacted moderate brown silt to sandy silt or a stiff clay to sandy clay, whereas near the Las Vegas Wash, the contact is marked by gray-green to yellow-green gypsiferous clays and silts. Along Las Vegas Wash, about two miles north of the Site, a well was drilled that encountered over 2,000 feet of gypsiferous sediments, the upper part of which is Muddy Creek formation and the lower part is likely the older Miocene Horse Springs formation (Tetra Tech EM, 2004). Geophysical evidence indicates that up to 6,000 feet of basin-fill occurs beneath Las Vegas Wash a few miles north of the Site (Langenheim, 1998).

2.5 Hydrogeology

2.5.1 Regional Hydrogeology

The most important aquifers in Las Vegas Valley occur within Pliocene and younger alluvial deposits. Three major intervals, and the overlying discontinuous Holocene surficial deposits, are mapped in most hydrogeologic investigations of Las Vegas Valley (Donovan, 1996). The deepest interval, more than 1,000 feet below land surface, is a low permeability aquifer named by Maxey and Jameson (1948) as the "Deep Zone of aquifers". This zone does not readily yield water to wells, but contains substantial quantities of groundwater. Discharge from this zone is by upward leakage and underflow. Because it is very difficult to pick the contact between the Pliocene/Quaternary alluvium and Miocene-Pliocene(?) Muddy Creek formation in the subsurface, the thickness of the post-Miocene sediments has been open to interpretation. It is generally thought that the interval below 1,000 feet is the Miocene-Pliocene(?) Muddy Creek formation. Covay and others (1996) state that the principal unconsolidated basin-fill aquifers are more than 3,000 feet thick.

Overlying this deep interval are Maxey and Jameson's "Middle and Shallow Zone(s) of aquifers", corresponding to the most permeable part of Harrill's (1976) "principal aquifers". The entire "principal aquifers" zone combines Maxey and Jameson's "Shallow, Middle and Deep Zones of aquifers" into a single hydrogeologic unit. Most of the groundwater supply in the Las Vegas Valley has come from the "principal aquifers". The age of the confining sedimentary units is most likely Pliocene and younger.

Harrill's Near-Surface Reservoir, which corresponds to the Near-Surface Aquifer of Maxey and Jameson, is the first good-quality groundwater encountered upon drilling and overlies the "principal aquifers". It occurs under both unconfined (water table) and confined (artesian) conditions, generally more than 100 feet below ground level. Under natural pre-pumping conditions, the water in this reservoir was derived mostly from upward leakage from the primary artesian system. Infiltration of sanitation process water, industrial process water, and irrigation water subsequently became the main source of recharge to the Near-Surface Reservoir. Discharge is almost entirely through evapotranspiration in the central portions of the Las Vegas Valley. Harrill's Valley-Fill Reservoir is the combination of the Near-Surface Reservoir and the principal aquifers.

Overlying the Near-Surface Reservoir of Harrill is the "shallow aquifer(s)", described by Harrill (1976), Van Denburgh and others (1982) and Zikmund (1996), which generally occurs in the upper 30 feet of saturated sediments over about 128 square miles of the valley. Shallow groundwater beneath the Site is within this aquifer. Plate 5 illustrates the potentiometric surface of this aquifer during May, 2004. Recharge to the "shallow aquifer" is generally through over-

irrigation and other forms of water application to the land surface. Discharge is by evapotranspiration and downgradient movement to Las Vegas Wash.

Aquifers in the Las Vegas Valley are separated by thick sequences of fine-grained deposits which exhibit a low permeability. Interconnection between these aquifers in the valley occurs through upward leakage along fault zones and through semi-confining layers. Recharge to the Near-Surface Reservoir (aquifer) is generally through over-irrigation and other forms of artificial water use to the land surface, as well as "upward leakage" through fault zones and semi-confining layers. Recharge to the "principal aquifers" is primarily through the artesian flow system and run-off from precipitation occurring in the surrounding mountains which infiltrates the alluvium along the valley margins. Locally, some secondary recharge may be derived from downward percolation of excess surface water.

2.5.2 Local Hydrogeology

Alluvial Aquifer. The first groundwater encountered in the study area occurs within the "shallow aquifer(s)", more than 30 feet below ground surface (bgs) beneath the Site on the south, and is at, or near, the ground surface at Las Vegas Wash on the north. The measured horizontal hydraulic gradients in this aquifer are generally northward between 0.001 to 0.04 ft./ft., whereas the average hydraulic gradient is 0.017 ft./ft. As shown on Plate 5, the flow direction of the potentiometric surface mimics the ground surface and is to the north-northeast with minor variations.

As stated above, the Quaternary paleochannels act as preferred pathways for groundwater flow. Based on tracer tests north of Athens Road, the groundwater can flow in these paleochannels at an average rate of 35 feet per day (Kerr-McGee, 1998c and 2001). Extrapolating this velocity over the total distance involved and assuming that perchlorate travels at the same rate as the groundwater; the residence time for perchlorate in the Main Channel to move from Athens Road to Las Vegas Wash is about 6 months.

The results of a 1998 pump test in the Athens Road area indicate a permeability of 50 gallons per day per square foot (gpd/ft^2), a transmissivity of 1,300 gpd/ft, and a groundwater velocity of 220 ft. per year for groundwater in the Main Channel (Kerr-McGee, 1998c).

In the study area, the chemistry of the groundwater in the "shallow aquifer(s)" is generally a sodium chloride-sulfate type and is classified as slightly to moderately saline. Evapotranspiration concentrates the natural salts in the shallow aquifer, resulting in low-quality water with high total dissolved solids levels in the range of 3,000 to over 10,000 milligrams per liter (mg/l) (Zikmund, 1996, Kerr-McGee, 1998c).

Muddy Creek Aquifer. Within the Las Vegas Valley, groundwater also occurs within the coarse-grained facies of the Muddy Creek formation. Based on both depth to water and water quality, it

is thought that this water is in the Near-Surface Reservoir of Harrill. This water, averaging an electrical conductivity of about 1,100 micro Siemen per centimeter (µS/cm), is of generally good quality where not impacted by industrial and residential contaminants. As sampled beneath the Site in February 2004 in well TR-1, the groundwater from the highest coarse-grained Muddy Creek unit contained 46 mg/l calcium, 190 mg/l chloride, 150 mg/l sodium, and 210 mg/l sulfate. Deep wells drilled into the Muddy Creek formation all exhibit artesian conditions, with some wells flowing at the surface. Most shallow wells drilled into the shallow Muddy Creek also demonstrate an upward hydraulic gradient.

Plate 5 shows that on the Site, south of the interceptor well field (near C-C' on Plate 5), the first groundwater encountered is in the upper part of the highest fine-grained facies of the Muddy Creek. Based on chemistry, this water is within the poorer-quality "shallow aquifer(s)," not the good-quality Near-Surface Reservoir of Harrill.

Surface Water. Surface water in the study area flows to the north toward Las Vegas Wash. Flow occurs as infrequent storm runoff which drains across the alluvial apron in shallow washes. Drainage and diversion structures have been constructed around the perimeters of the BMI complex to channel surface water flow. Las Vegas Wash is a tributary to Lake Mead and it is the only channel through which the valley's excess water flows to the lake. The water flowing through Las Vegas Wash comprises less than two percent of the water that flows into Lake Mead and consists of urban runoff, shallow groundwater, storm water, and releases from the valley's three water reclamation facilities (Southern Nevada Water Authority, 2004).

Water Supply. Lake Mead is a major reservoir on the Colorado River which supplies about 85 percent of the total water used in the Las Vegas Valley. Groundwater is used to meet approximately 15 percent of the annual water needs for the Las Vegas Valley. During the hot summer months from May to September, groundwater can account for 39 percent of the valley's daily water demands (Las Vegas Valley Groundwater Management Program). There are reportedly 6,800 wells within the Las Vegas Valley that provide groundwater year-round to residents and other users that are not connected to a municipal water supply. There are no water supply wells reported within four miles of the Site that extract water from the "shallow aquifer".

3.0 HISTORICAL INFORMATION

Numerous investigations have been conducted to evaluate the nature, extent, and movement of contaminants on site and in downgradient and cross gradient areas. A summary of the Site history and the soil and groundwater investigations is presented below.

3.1 Historical Summary

The BMI complex has seen operation since 1942 and was originally sited and operated by the United States (US) government as a magnesium production plant. A portion of the complex was leased by Western Electrochemical Company (WECCO) in 1945. In November 1950, a large pilot plant was constructed, which went into operation in 1951. By August 1952, WECCO had purchased several portions of the complex. In May 1953, a ten tons-per-day plant was constructed to replace the pilot plant. In June 1953, production started on high-purity manganese metal. In 1955, WECCO merged with American Potash and Chemical Company (AP&CC) and this company operated at the Site through 1967. In 1962, AP&CC purchased the ammonium perchlorate plant, sodium perchlorate plant, and half of the sodium chlorate plant from the federal government. Kerr-McGee purchased AP&CC in 1967. Other companies that operated within the BMI complex included Stauffer Management Company, Inc., Titanium Metals Corporation, U.S. Lime, Montrose Chemical Corporation, State Industries, Jones Chemical Company, Valite Industries, Hardesty Chemical Company, and Pioneer Chlor Alkali Company, Inc. (Ecology and Environment, 1982; and Kleinfelder, 1993). Details regarding ownership and leases within the BMI complex are available in the 1993 Phase I Environmental Conditions Assessment (Phase I ECA) report (Kleinfelder,1993).

During the 1970s, the USEPA, the State of Nevada, and Clark County investigated potential environmental impacts from the BMI companies' operations, including atmospheric emissions, groundwater and surface water discharges, and soil impacts (Ecology and Environment, 1982). From 1971 to 1976, Kerr-McGee modified their manufacturing process and constructed lined surface impoundments to recycle and evaporate industrial wastewater. In 1976, Kerr-McGee achieved zero discharge status regarding industrial wastewater management. In 1980, the USEPA requested specific information from the BMI companies regarding their manufacturing processes and their waste management practices by issuing Section 308 letters. In 1994, the NDEP issued a Letter of Understanding (LOU) that identified 69 specific areas or items of interest and indicated the level of environmental investigation they wanted Kerr-McGee to conduct (Plate 6 and Table 1).

Table 2 lists the products made, years of production, and approximate waste volumes for WECCO, AP&CC and Kerr-McGee. This table was developed from data presented in the 1993 Kleinfelder Phase I ECA report.

Kerr-McGee has undertaken environmental investigations to assess specific impacts in the area. Plates 7 and 8 present the extent of groundwater impacts for chromium and perchlorate from May 2004, extending from the Site to Las Vegas Wash. Plates 9 through 13 present additional detail regarding the groundwater impacts on Site.

3.2 Chromium Investigations

A groundwater investigation was initiated by Kerr-McGee in July 1981 to comply with the federal Resource Conservation and Recovery Act (RCRA) standards for monitoring the existing on-Site impoundments. At that time, nine monitoring wells were installed. In December 1983, the NDEP requested that Kerr-McGee investigate the extent of chromium impact in the groundwater beneath the facility.

The investigation included the installation of 43 monitor wells. A Consent Order between Kerr-McGee and NDEP was issued in September 1986 (NDEP, 1986) which stipulated the requirement for additional characterization and the implementation of remedial activities to address chromium in the groundwater. As a result of the 1986 Consent Agreement, 22 additional monitor wells, 11 groundwater interceptor wells, and two treated-water injection trenches were installed prior to start-up of the chromium mitigation system in September 1987.

Initially, the 11 groundwater interceptor wells delivered approximately 100 gallons per minute (gpm) to the treatment system. The treatment technology was based upon a sacrificial iron electrode which reduced the hexavalent chromium (Cr^{+6}) to trivalent chromium (Cr^{+3}) and co-precipitated the Cr^{+3} together with iron oxide.

From initiation of remedial activities through 1993, the system captured and treated over 200 million gallons of groundwater and removed an estimated 8,500 pounds (lbs) of chromium from the environment. In September 1993, an evaluation was completed of the chromium remedial system. This study led to the conclusion that the extensive dewatering of the alluvium in the vicinity of the interceptor well field and the localized groundwater flow in discrete channels in the underlying Muddy Creek formation were contributing to a decline in recovery volumes. Based on these findings, Kerr-McGee installed four additional groundwater recovery wells to improve capture in the discrete channel flow areas. Over the next several years, additional interceptor wells were installed as part of continued alluvial dewatering and groundwater capture efforts. Two wells were installed in 1998 and five more in early 1999.

In late 1999, Kerr-McGee investigated methods to enhance the capture of groundwater in the interceptor well field. The investigation led to installation of a bentonite-slurry barrier wall (barrier wall), approximately 1,600 feet long, 60 feet deep, and 3 feet wide, located on the

downgradient side of the interceptor well line. This barrier wall was completed in late September 2001 and its location is shown on Plate 10. By November 2001, groundwater recovery volume from the interceptor well field had increased from approximately 23 gpm to over 50 gpm. The interceptor well field has been averaging approximately 55 gpm since that time, and a "clean line" of much reduced chromium concentrations in the groundwater extends significantly downgradient from the barrier wall. The "clean line" was evident in 1999 but discrete areas were significantly improved by this action.

As of May 2004, the interceptor well/treatment system is capturing approximately 55 gpm at a chromium concentration of approximately 15 ppm. Figure 2 shows the potentiometric surface at the barrier wall and the infiltration trenches from May 2004. Since construction of the barrier wall, approximately 85 million gallons of groundwater have been captured and treated, and over 9,000 lbs of chromium have been removed. This value is based on an average flow rate of 55 gpm from October 2001 through September 2004 at an average chromium concentration of 13 mg/l. Plates 7 and 10 illustrate the chromium concentrations in groundwater beneath the Site as measured in May 2004.

Performance reporting for the chromium mitigation program has been ongoing since 1987. A list of the performance reports is provided in Appendix C.

3.3 Environmental Conditions Assessment

In April 1991, Kerr-McGee was one of six companies that entered into a Consent Agreement with the NDEP (NDEP, 1991) to conduct environmental studies to assess Site-specific environmental conditions, which are the result of past and present industrial operations and waste disposal practices. The six companies that entered into the Consent Agreement included those past or present entities that conducted business within the BMI complex. The Consent Agreement specified that the companies accomplish the following:

- Identify past industrial practices and waste products generated;
- Identify known or suspected waste management units or areas active on or after November 19, 1980;
- Identify known or suspected spills of any pollutant or contaminant;
- Identify all current and prior owners and operators of any part of the Site;
- Collect and summarize records or investigations that identify, document or address soil, surface water, groundwater or air impacts; and
- Provide documentation of all measures that have been taken to monitor, characterize, mitigate or clean up Site environmental impacts.

In April 1993, and in compliance with the 1991 Consent Agreement, Kerr-McGee submitted the Phase I ECA (Kleinfelder, 1993) to NDEP. The purpose of the report was to identify and document Site-specific environmental impacts resulting from past or present industrial activities. The Phase I ECA included a thorough assessment of the geologic and hydrologic setting, as well as historical manufacturing activities. The assessment identified 31 solid waste management units (SWMUs), 20 areas of known or suspected releases or spills, and 14 miscellaneous areas where Site activities may have impacted the environment.

In response to the NDEP review of the Phase I ECA and discussions between the NDEP and Kerr-McGee, the NDEP issued a LOU summarizing requirements for additional information or data collection (NDEP, 1994). The LOU identified 69 study items to be addressed further (Table 1). Each of the LOU study items (referred to herein as LOUs #1 through #69) was addressed by one or more of the following actions:

A. Kerr-McGee provided additional information to the NDEP in a written response (35 items);

B. Kerr-McGee conducted field sampling and data collection (12 items);

C. Field investigation by the Henderson Industrial Site Steering Committee (2 items); or

D. "No further action required at this time" (20 items).

Table 1 summarizes the action taken for each LOU study item. On October 2, 1996, Kerr-McGee submitted complete responses to the 35 LOU items requiring additional information or explanation (Kerr-McGee, 1996b).

In 1996 and 1997 Kerr-McGee conducted additional data collection as part of a Phase II ECA. The field investigations were conducted in compliance with an NDEP-approved work plan (Kerr-McGee, 1996a). The Phase II ECA addressed the 12 LOUs that were identified as needing additional characterization. In August 1997, Kerr-McGee submitted the Phase II ECA (ENSR, 1997) report to the NDEP.

On June 10, 1998, the NDEP issued comments to the Phase II ECA report (NDEP, 1998a) which conditionally approved the document, subject to selected additional work and development of a conceptual site model.

On November 9, 1998, Kerr-McGee submitted a response to the NDEP comments to the Phase II ECA report, and included with the responses a Supplemental Phase II ECA Work Plan (Kerr-McGee, 1998d) designed to provide the supplemental data required by the NDEP for the Phase II ECA.

On December 17, 1998, the NDEP replied to Kerr-McGee in a letter regarding the Phase II ECA Response to Comments and Supplemental Phase II ECA Work Plan. NDEP

correspondence indicated that they conditionally approved Kerr-McGee's Response to Comments and the Supplemental Work Plan. According to the NDEP, the Work Plan was approved subject to "including the development of a CSM for the Site and comparing the soil sample results that were and will be obtained to the Nevada cleanup standards and actual background values".

In March and April 1999, the NDEP-approved field work for the Supplemental Phase II ECA was conducted. In April 2001, Kerr-McGee prepared a report of the findings of the supplemental field work and submitted them to the NDEP as the Supplemental Phase II ECA (ENSR, 2001).

In February 2004, the NDEP provided a response to the Kerr-McGee Supplemental Phase II ECA. NDEP indicated that additional work would be required, including identification of all potential contaminants associated with the Site, background sampling, assessment of site-specific action levels, and identification of data gaps.

Attachment A of the February 2004 NDEP Response Letter identified additional issues. To address these issues Kerr-McGee has met regularly with NDEP and developed a schedule for providing the requested information. Individual Kerr-McGee submittals are being modified, as needed, to address specific requests. As part of the development of the CSM, the NDEP requested that the site be addressed as a whole, as opposed to individual source areas. For that reason, the LOUs identified in 1994 have been compiled within groups that demonstrated similar contaminant characteristics. After reviewing the historical data, the following chemical contaminant groups were identified: perchlorate, chlorate, (total dissolved solids) TDS-conductivity, chromium, manganese, boron, petroleum hydrocarbons, and miscellaneous. Table 3 presents the LOUs subdivided within the identified chemical contaminant groupings.

3.4 Perchlorate Investigation

In mid-1997, analytical methods were developed to detect low perchlorate concentrations (down to 0.004 mg/l), and governmental and regulatory concern increased regarding the health hazards of perchlorate in drinking water. Perchlorate was subsequently discovered in the Colorado River and traced upstream to Henderson and the location of two ammonium perchlorate manufacturing facilities, one of which was the Site.

In late 1997, Kerr-McGee undertook a perchlorate characterization study (Kerr-McGee, 1997a) to determine both the subsurface pathway(s) and the perchlorate concentrations in shallow groundwater downgradient from the Kerr-McGee Henderson facility to its discharge in Las Vegas Wash. Historic subsurface data were collected and analyzed and a sampling plan was developed (Kerr-McGee, 1998a). Between March and June 1998, soil borings and monitor wells were drilled and installed and the subsurface data was mapped and analyzed.

In July 1998, Kerr-McGee submitted the Phase II Groundwater Perchlorate Investigation Report (Kerr-McGee, 1998b) to the NDEP. The report presents a compilation of information from both historical sources and recent field investigations, together with recommendations for further actions.

Results of the field assessment indicate that the main alluvial channel trends from the southwest to the northeast near the northern boundary of the Kerr-McGee facility downgradient to Las Vegas Wash. The channel ranges from 700 to 1,000 feet wide with a maximum depth approaching 60 feet. A permeability of 50 gpd/ft^2 and a transmissivity of 1,300 gpd/ft were calculated from the pump tests within the channel deposits underlying the Pittman Lateral.

Perchlorate concentrations in the alluvial groundwater study area range from 1,500 mg/l at the northern Kerr-McGee facility boundary to around 100 mg/l between the City of Henderson Rapid Infiltration Basins (COH-RIBs) and the Las Vegas Wash. The north-trending perchlorate plume is displaced eastward from the main alluvial channel just north of the Kerr-McGee property by a high conductivity plume which converges from the west and preferentially occupies the western part of the channel. The perchlorate plume eventually begins to merge and mix with the higher conductivity plume at, and downgradient from, the Pittman Lateral.

An outcome of this groundwater investigation report was the first map showing the perchlorate and conductivity plume extent, the most recent depictions of which are shown on Plates 8 and 9. Available historic subsurface data indicated that the perchlorate was generally confined to a Quaternary-age alluvial channel eroded into the underlying sediments. Subsurface mapping demonstrated that the deepest and best defined section of the channel lay beneath the Pittman Lateral (Athens Road) area, about one mile south of Las Vegas Wash. With the NDEP's approval, a strategy was defined for recovery of perchlorate-impacted groundwater. The recovery strategy included:

- Groundwater collection for perchlorate reduction at the source on the Site;
- Groundwater collection for perchlorate reduction at the Athens Road transect (in the Pittman Lateral area).

In September 1998, a recovery well (PC-70) was installed at Athens Road and began the recovery of small volumes of perchlorate-bearing shallow groundwater. The construction history and pump test results were discussed in a report submitted to the NDEP in October, 1998 (Kerr-McGee, 1998c).

On-Site capture of perchlorate-bearing groundwater began in late 1998. The chromium interceptor well line continued to capture on-Site groundwater for treatment to remove hexavalent chromium. However, instead of re-injecting the groundwater treated for chromium to the shallow aquifer, it was impounded for later, additional, perchlorate treatment. An 11-acre lined pond (GW-11) was completed in late-1998 to contain this recovered groundwater.

In the spring of 1999 hydrologists with the Southern Nevada Water Authority discovered a perchlorate-impacted seep (Seep), on-trend with the buried alluvial channel, discharging into Las Vegas Wash. At the time of discovery, the Seep was flowing at about 400 gpm and contained over 100 mg/l perchlorate. At the request of the regulatory agencies, Kerr-McGee undertook a study to delineate the perchlorate in groundwater and to investigate appropriate and feasible means to remediate perchlorate in the Seep area.

On July 26, 1999, Kerr-McGee and NDEP entered into a Consent Agreement (NDEP, 1999) to initiate remedial measures to intercept and treat the perchlorate-bearing water flowing from the Seep area into Las Vegas Wash. A weir-sump combination and temporary ion exchange (IX) unit were commissioned and began treating collected water in October 1999. This activity represented a third leg of the perchlorate remedial strategy:

- Groundwater collection for perchlorate reduction in the Seep area close to Las Vegas Wash.

In early 2000, there was interest in 1) making an early impact on Las Vegas Wash perchlorate concentrations; 2) determining how the perchlorate in groundwater was entering the wash; and 3) assessing how fast the groundwater moved. This led to another phase of drilling, sampling, and monitor well construction that lasted from March to September 2000. In March 2000, Kerr-McGee submitted a Work Plan for Seep Area Groundwater Characterization to the NDEP (Kerr-McGee 2000). This Work Plan was designed to aid in understanding the hydrogeologic conditions in both the Seep and Pittman Lateral areas, with a goal of delineating the pathways by which perchlorate could enter the Las Vegas Wash from the Site.

In January 2001, Kerr-McGee prepared the Seep Area Groundwater Characterization Report (Kerr-McGee, 2001). This report contains the results of field activities completed consistent with the March 2000 work plan. The first well in the Seep well field area (monitor well PC-99) was installed during this program.

The Seep Area Groundwater Characterization Report documented that the groundwater was traveling an average of 35 feet per day between Athens Road and the Seep; that there were no other major downgradient sources of perchlorate along Las Vegas Wash; and that the entire saturated thickness of the alluvial channel contained variable concentrations of perchlorate.

In mid-2001, at the direction of NDEP, Kerr-McGee constructed the first three recovery wells in the Seep well field. These wells began contributing groundwater to the temporary ion exchange (IX) plant in late 2001.

To allow groundwater from all three areas intended for remediation to be collected and treated with an efficient permanent perchlorate reduction process, an 825 gpm redeemable IX System (ISEP®)/catalytic destruction plant) was designed and constructed on the Kerr-McGee Henderson facility in early 2002. The Athens Road well field was completed in March 2002 and groundwater collection in this area began shortly afterward in support of commissioning the ISEP®/catalytic destruction process. Continuous pumping from the Athens Road well field began in mid-October 2002. Groundwater capture from the targeted buried alluvial channel underlying Athens Road appears to be complete. Figure 3 presents the potentiometric surface at Athens Road for May 2004.

A temporary IX process treatment system was placed in service on-Site to supplement the Seep area temporary IX process treatment system during the difficult commissioning of the permanent on-Site ISEP®/ catalytic destruction treatment plant.

Under further direction of the NDEP, Kerr-McGee increased the quantity of Seep area groundwater collected for treatment. In February 2003, five additional wells (PC117 to PC121) were completed and added to the Seep well field. At present (February 2005), the Seep well field consists of nine wells – two of which (PC-99R2 and R3) are connected and operate as one. The Seep well field is located over the deepest part of the alluvium channel that comprises the migration path for the highest concentrations of perchlorate. The well field is located about 600 feet upgradient of the Seep area surface flow capture sump.

The permanent on-Site ISEP®/catalytic destruction process treatment system eventually proved to be unworkable and was abandoned in favor of biological Fluidized Bed Reactor (FBR) technology. Construction of a 1,000 gpm (peak flow) biological treatment plant was completed in early 2004. Optimization of the plant operations continued into the fourth quarter of 2004. The temporary IX system at Las Vegas Wash near the Seep well field was shut down on June 11, 2004, and the on-Site temporary IX system was shut down in the first quarter of 2004.

As of October 31, 2004, 1,401.73 tons of perchlorate had been removed from the environment over the life of the perchlorate remediation project.

On October 8, 2001, NDEP and Kerr-McGee entered into an Administrative Order on Consent (AOC) (NDEP 2001). The AOC addresses the remediation of perchlorate in groundwater and surface water. The October 2001 AOC augments the July 1999 Phase I Consent Agreement

which was limited to the treatment of perchlorate-contaminated surface Seep water using a temporary IX system.

The October 2001 AOC stipulates that Kerr-McGee will construct a treatment system capable of treating 825 gallons per minute for removal of the perchlorate from surface and groundwater collected from upgradient of the slurry cutoff wall, the Athens Road groundwater extraction well system, and the Las Vegas Wash and Seep collection areas. The collected groundwater will be treated to remove perchlorate and discharged in accordance with the limits set forth in the existing National Pollutant Discharge Elimination System (NPDES) permit.

Performance reporting for the perchlorate mitigation program has been ongoing since 1997. A list of the perchlorate mitigation performance reports is provided in Appendix C.

4.0 SOURCE CHARACTERIZATION

Potential environmental impacts at the Kerr-McGee Henderson facility were identified, assessed and/or characterized in the 1993 ECA (Kleinfelder, 1993), the LOU (NDEP, 1994), the 1996 Written Response (Kerr-McGee, 1996b), the 1997 Phase II ECA, (ENSR, 1997) and the 2001 Supplemental Phase II ECA (ENSR, 2001). As shown on Tables 1 and 3, the 69 items that are identified in the LOU have been subdivided into common potential contaminant groups for discussion. Some of the LOUs are potential sources for more than one contaminant and, as such, are discussed within one or more of the groups below. The location of each LOU is shown on Plate 6, as well as on Plates 8 through 16. In addition to the broad LOU identification process above, Kerr-McGee has embarked on two remedial efforts as the impacts from chromium and perchlorate in groundwater were identified and characterized. Additional details regarding the chromium and perchlorate groundwater remediation activities are discussed in sections 3.2 and 3.4 above.

As part of the ECA process, Kerr-McGee worked with NDEP to develop and refine a Site-related chemicals list (Table 4). This list includes Site-related chemicals, products, intermediate and breakdown products, and chemical combinations that may be associated with the current or historic activities at the Site as it exists in the geographic setting within an industrial complex, with industrial manufacturing neighbors. Table 5 presents the list of Site-related chemicals in alphabetical order. In response to an NDEP request in the February 11, 2004 letter, Table 6 summarizes the applicable 2004 EPA Region IX Preliminary Remediation Goals (PRGs) and Federal Maximum Contaminant Levels (MCLs) for drinking water.

As part of the development of the CSM, the NDEP requested that the Site be addressed as a whole as opposed to individual potential source areas. For that reason, LOUs identified in 1994 have been subdivided into groups that were suspected to represent potential sources of similar contaminants. After reviewing the historical data, the following chemical contaminant groups were identified: perchlorate, chlorate, TDS-conductivity, chromium, manganese, boron, petroleum hydrocarbons, and miscellaneous (Table 3). Some LOU study areas are included in more than one chemical group because it is possible that a study area may present several types of impact.

Within each section below, the discussion pertaining to a LOU area has been focused on a specific chemical or chemical group. Other chemicals potentially associated with a specific LOU are discussed under the “miscellaneous” grouping. The locations of potential source areas discussed in the LOU are depicted on Plate 6 and Plates 10 through 16. Diagrams of LOU sample locations from previous reports are included in Appendix D.

4.1 Perchlorate

Perchlorate was identified as a potential chemical contaminant at the Site and has ongoing groundwater remediation in place, both on Site and off Site. Kerr-McGee has focused perchlorate remediation efforts on assessment, containment and clean-up of the impacted groundwater downgradient from suspected source areas. Details regarding the groundwater remediation program progress have been provided in Section 3 of this report and updates are provided quarterly (for perchlorate) and semi-annually (for chromium) to NDEP. Table A-1 in Appendix A contains historic perchlorate analytical groundwater data. Please refer to Plate 11 for the location of the LOUs relative to perchlorate concentrations in groundwater.

4.1.1 LOU #16, #17, #18 and #19 AP-1, AP-2, AP-3, AP-4 and AP-5 Ponds and Associated Transfer Lines

Five synthetically lined surface impoundments (AP-1, AP-2, AP-3, AP-4, and AP-5) were part of the ammonium perchlorate (AP) manufacturing process (Plates 6 and 11). To evaluate potential perchlorate impacts, data from three existing monitor wells, M-17, M-89, and M-25, were reviewed. Refer to Table 7 for the analytical results. Please refer to Plate 11 for pond and transfer line locations relative to perchlorate concentrations in groundwater and other potential perchlorate source areas. LOUs #16 and #17 were also assessed for nitrate and chromium impacts (Table 7). Nitrate and chromium are removed from treated groundwater in the ongoing remedial activities associated with the Site.

4.1.2 LOU #30 Ammonium Perchlorate Area – Pad 35

Pad 35 is located south of the building known as old D-1. It consists of an "L" shaped concrete pad approximately 30 feet by 12 feet. The base of the "L" measures 6 feet by 10 feet. This area was used for accumulation of drummed common trash potentially contaminated with perchlorate and other industrial wastes, such as cooling tower sludge and iron oxide sludge. Please refer to Plate 11 for the location of this pad (LOU #30) relative to perchlorate concentrations in groundwater and other potential perchlorate source areas. The NDEP required no further action for LOU #30.

4.1.3 LOU #31 Drum Crushing and Recycling Area

The drum crushing area (serving the ammonium perchlorate production) consisted of a drum crusher located on an 18 feet by 18 feet concrete pad located just east of the old D-1 building. Drums destined for disposal were emptied and rinsed prior to delivery to this area. Soils adjacent to the drum crushing area were transported to the AP-4 pond for recovery of the residual perchlorate (Kerr-McGee, 1996b). This area is located up-gradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 11 for the

location of LOU #31 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.4 LOU #32 Groundwater Remediation Unit

The groundwater remediation unit occupies an approximate area of 1,200 feet by 650 feet. It includes a line of groundwater interceptor wells, the groundwater treatment process (GWTP), the groundwater barrier wall, two recharge trenches and the GW-11 pond. The GWTP is located to the east of new D-1 building on a 60 foot by 20 foot concrete pad with containment curbing. In the early 1990s portions of the recharge trenches became plugged and required modifications. During this time treated water occasionally would emerge from the trenches' water elevation test wells and impact surface soils (Kerr-McGee, 1996b). This water contained iron oxide, which colored the affected area red. Although the trenches were refurbished, system modifications have resulted in the treated water being discharged to the GW-11 pond rather than placed into the recharge trenches. Please refer to Plate 11 for the location of LOU #32 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.5 LOU #33 Sodium Perchlorate Platinum By-product Filter

The platinum recovery filter press was located on a 75 foot by 100 foot concrete pad east of the Unit 5 cell floor. The pad was equipped with a sump that collected and contained liquids, including process liquids and wash-down water. Cracks in the floor, noted during the Phase I investigation, were coated with a Chevron industrial membrane material that provided a continuous cover over the floor (Kerr-McGee, 1996b). While analysis of groundwater impacts is ongoing, this area is located up-gradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 11 for the location of LOU #33 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.6 LOU #43 Unit 4 and 5 Basements

Sodium chlorate was historically produced in electrolytic cells located in Units 4 and 5. Additionally, these Units were used to produce sodium perchlorate at times. Both of these electrolytic processes contained chlorate and perchlorate as well as sodium dichromate (hexavalent chromium). In support of the chlorate and perchlorate production, the basements of Units 4 and 5 were used as sumps to collect spillage and wash-water. Operation of the electrolytic cells in Units 4 and 5 was discontinued in the late 1990s, but the buildings and structures remain for future use. Removal of the impacted soil beneath these buildings would likely require destruction of each building. Portions of these buildings actively participate in the manufacturing process. Other portions of the buildings are in good condition and may be utilized for active manufacturing in the future. Some or all of the soil underlying Units 4 and 5

may be impacted with concentrations of perchlorate, chlorate or chromium. Please refer to Plate 11 for the location of LOU #43 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.7 LOU #52 AP Plant Area Screening Building, Dryer Building, and Associated Sump

The Dryer and Screening buildings shared a common sump and floor drain system. The sump collected wash-down water and, on rare occasions, overflowed. Secondary containment was installed around the sump and a lined collection ditch was constructed completely around the building. Soil exhibiting white stains was collected and recycled for perchlorate recovery. Please refer to Plate 11 for the location of LOU #52 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.8 LOU #53 AP Plant Area Tank Farm

The AP tank farm contained a number of vertical open-top and closed-top tanks used for process solution storage. The tank farm was equipped with secondary containment and a sump. Contained spills were reported from the tanks in the past. Please refer to Plate 11 for the location of these tanks relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.9 LOU #55 Area Affected by July 1990 Fire

On July 18, 1990, a fire occurred in the AP drum storage pad area. The fire burned for approximately 45 minutes. The soil around the fire area was impacted with ammonium perchlorate, which was washed off the concrete pad by the fire suppression water. The impacted soil was collected and returned to the AP process to recover residual perchlorate. The burned asphalt and soil surrounding the area (approximately 30 cubic yards of material) were removed and sent to the US Ecology disposal facility in Beatty, Nevada. Please refer to Plate 11 for the location of LOU #55 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.10 LOU #56 AP Plant Area Old Building D-1 Washdown

During material handling, mixing and blending, small amounts of AP dust fell to the old D-1 building floor. While housekeeping in the area was maintained by dry sweeping, about once every other month, the building was also washed-down after sweeping. The wash-down water contained dissolved AP and drained onto the asphalt pad surrounding the building. Some of the wash water also drained onto the soil adjacent to the asphalt (Kerr-McGee, 1996b). Please refer to Plate 11 for the location of LOU #56 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas.

4.1.11 LOU #57 and #58 AP Plant Area New Building D-1 Wash-down and AP Plant Transfer Lines to Sodium Chlorate Process

The AP process-to-pond transfer lines extended from the AP process to the sodium chlorate ponds or process. The ponds and lines were in service from 1974 to 1995. The transfer lines occasionally released process solution to the ground. The lines were repaired, replaced or serviced on an as-needed basis. Please refer to Plate 11 for the location of LOU #57 and #58 relative to perchlorate concentrations in groundwater and other potential perchlorate source areas. The NDEP required no further action for LOU #57 and #58.

4.2 Chlorate

Chlorate was identified as a potential contaminant due to the historic chlorate manufacturing processes on Site. Kerr-McGee has focused groundwater remediation efforts on assessment, containment, and clean-up of the impacted groundwater downgradient from suspected source areas. Details regarding the groundwater remediation program progress have been provided in Section 3 of this report and are primarily focused on perchlorate and chromium, however, chlorate is also removed from treated groundwater in the ongoing remedial activities associated with the Site. Chlorate impacts have been included on the same Plate as TDS impacts because these constituents increase the specific conductivity of groundwater. Table A-1 in Appendix A contains historic specific conductivity groundwater data. Please refer to Plate 12 for the location of the LOUs relative to specific conductivity in groundwater.

4.2.1 LOU #7 and #8 Old P-2 and P-3 Ponds and Associated Conveyance Facilities

Surface impoundments were used to collect and concentrate dilute sodium chlorate solutions as part of the sodium chlorate production process. The concentrated solutions were recycled from the ponds back into the process. Old P-2 and P-3 were lined ponds used for this process from 1978 to 1986. Old P-2 encompassed approximately 0.1 acre (4,400 ft^2) and P-3 encompassed approximately 0.3 acre (13,000 ft^2) (Kleinfelder, 1993). The ponds were constructed with single-layer synthetic liners. The ponds were taken out of service prior to 1987 and the remaining solids, liner, and underlying soils were removed and disposed at the U.S. Ecology waste disposal facility in Beatty, Nevada.

The Old P-2 and P-3 ponds were investigated in response to LOUs #7 and #8. The Old P-2 pond was identified as SWMU KMCC-010 in the Phase I ECA and the LOU (Kleinfelder, 1993; NDEP, 1994). During the Phase II ECA investigation, considerable effort was undertaken to characterize total chromium impacts associated with the ponds (Table 8) (ENSR, 1997 and 2001). Please refer to Plate 12 for the locations of LOU #7 and #8 relative to specific conductivity in groundwater and other potential chlorate and TDS source areas.

4.2.2 LOU #9 New P-2 Pond and Associated Piping

The New P-2 surface impoundment (pond) was initially constructed with two liners: a 30-mil un-reinforced PVC liner and a 36-mil reinforced polyester liner. Approximately 18 months after being constructed, an additional 60-mil high-density polyethylene liner was installed. The pond was regulated under NPDES permit #NV0000078. The New P-2 pond had leak detection which was monitored monthly. In addition, there are groundwater wells present upgradient and downgradient of this location. Analysis of groundwater impacts in the area of New Pond P-2 is presented in Table 9. Please refer to Plate 12 for the location of LOU #9 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.2.3 Chlorate LOU #11 Specific Information Regarding Sodium Chlorate Filter Cake Drying Pad area

Prior to the early 1990s the Filter Cake Drying Pad was used to dry particulate material removed from the sodium chlorate process. In the early 1990s a new tank containment system was constructed in the drying pad location. Before construction, the existing pad structure was demolished and the material generated was managed as hazardous waste (due to total chromium content of the upper surface) and appropriately disposed off Site. According to Alan Gaddy, a Kerr McGee employee who observed the demolition, discolored soil was removed and disposed with the concrete (Kerr-McGee, 1996b). Please refer to Plate 12 for the location of LOU #11 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.2.4 LOU #12 Hazardous Waste Storage Area

LOU #12 is located to the northwest of Unit 4 and was the location where waste from the sodium chlorate process was stored in a semi-dump trailer, in preparation for transportation to a commercial hazardous waste disposal site (TSDF). The waste was initially transferred from the process to the trailer by a front-end loader, but in the later years of operation the material was transferred by dumping from a collection bin into the trailer. The semi-dump trailer was periodically transported off Site to the TSDF. NDEP has indicated that no further action was required for LOU #12. Please refer to Plate 12 for the location of LOU #12 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.2.5 LOU #13 and #14 Ponds S-1 and P-1

S-1 and P-1 ponds were single-lined surface impoundments used by the sodium chlorate process. The S-1 pond footprint was approximately 47,500 $ft^{2.}$ The liner was constructed of 20-mil PVC on the bottom and 30-mil cross-linked polyethylene (CPE) on the sides (Kleinfelder, 1993). Pond P-1's footprint and liner were similar to S-1. The ponds were closed in 1983 and final closure was approved by the NDEP on December 5, 1985. During closure,

approximately two feet of soil from beneath the floor of each pond was also removed and soils sampled and analyzed to confirm adequate soil removal. Soil samples were analyzed by Extraction Procedure (EP) Toxicity methods and revealed concentrations of total soluble chromium between <0.02 mg/l and 0.11 mg/l (Tables 10 and 11). NDEP has indicated that no further action was required for LOU #13 and #14. Please refer to Plate 12 for the location of LOU #13 and #14 relative to groundwater specific conductivity and other potential chlorate and TDS source areas. Appendix D contains a diagram of the sample locations.

4.2.6 LOU #15 Platinum Drying Unit

The platinum drying unit was a 20 foot by 32 foot concrete floored and concrete bermed containment pad. In this area, a sodium perchlorate process by-product that contained recoverable platinum was processed. Following processing the platinum was recovered. In 1993 the concrete pad was sampled and analyzed for metals using Toxicity Characteristic Leachate Procedure (TCLP) extraction. Metal concentrations were below the method detection limit with the exception of chromium sampled. The area was demolished and the concrete transported to a hazardous waste TSDF. Soil under the pad was sampled for total chromium in 1994 (Table 12). Please refer to Plate 12 for the location of LOU #15 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.2.7 LOU #32 Groundwater Remediation Unit

The groundwater remediation unit occupies an approximate area of 1,200 feet by 650 feet. It includes a line of groundwater interceptor wells, the GWTP, the groundwater barrier wall, two recharge trenches and the GW-11 pond. The GWTP is located to the east of the new D-1 building on a 60 foot by 20 foot concrete pad with containment curbing. In the early 1990s portions of the recharge trenches became plugged and required modifications. During this time treated water occasionally would emerge from the trenches' water elevation test wells and impact surface soils (Kerr-McGee, 1996b). This water contained iron oxide, which colored the affected area red. Although the trenches were refurbished, system modifications have resulted in the treated water being discharged to the GW-11 pond rather than placed into the recharge trenches. Please refer to Plate 12 for the location of LOU #32 relative to specific conductivity in groundwater and other potential chlorate and TDS source areas.

4.2.8 LOU #43 Unit 4 and 5 Basements

Sodium chlorate was produced in electrolytic cells located in Units 4 and 5. Additionally, these Units were used to produce sodium perchlorate at times. Both of these electrolytic processes contained chlorate and perchlorate as well as sodium dichromate (hexavalent chromium). The basements of Units 4 and 5 were used at times as sumps to collect spillage and wash water. Operation of the electrolytic cells in Units 4 and 5 was discontinued in the late 1990s, but the

buildings and structures remain for future use. Removal of the impacted soil beneath these buildings would likely require destruction of each building. Portions of these buildings actively participate in the manufacturing process. Other portions of the buildings are in good condition and may be utilized for active manufacturing in the future. Some or all of the soil underlying Units 4 and 5 may be impacted with concentrations of perchlorate, chlorate or chromium. Please refer to Plate 12 for the location of LOU #43 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.2.9 LOU #61 Old Sodium Chlorate Plant Decommissioning

The old Sodium Chlorate Plant was located in Units 4 and 5. Production occurred in 1,300 electrolytic cells from 1945 to 1989. The process liquids contained primarily sodium chlorate with sodium dichromate as a process chemical additive. Retention of process liquids in the basements and sump areas of Units 4 and 5 was identified as a potential source of chlorate in groundwater. As the process was decommissioned, the electrolytic cells and associated piping were emptied. Residual materials, including the cell shells and other materials, which were hazardous due the hexavalent chromium concentration, were transferred to a hazardous waste TSDF in Beatty, Nevada. The process equipment, such as tanks, pipes and pumps, was dismantled in 1991 and transported off Site for disposal or recycling. The building area was cleaned and made available for other uses. The NDEP required no further action for LOU #61. Please refer to Plate 12 for the location of LOU #61 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.3 TDS – Conductivity

TDS were identified as potential chemical contaminants due to the historic use of salts in the on-Site industrial processes. Kerr-McGee has focused groundwater remediation efforts on assessment, containment, and clean-up of the impacted groundwater downgradient from suspected source areas. Details regarding the groundwater remediation program progress have been provided in Section 3 of this report and are primarily focused on perchlorate and chromium. Table A-1 in Appendix A contains historic groundwater specific conductivity data. Please refer to Plate 12 for the location of the LOUs relative to groundwater specific conductivity.

4.3.1 LOU #20 Pond C-1 and Associated Piping

Pond C-1 was a single-lined surface impoundment. It was constructed with a single 60-mil PVC liner and covered 1.58 acres (69,000 ft^2). The pond was used to evaporate non-hazardous process water, primarily from steam production, but at times also from the boron and manganese dioxide processes. Four groundwater monitor wells have been monitored in the vicinity of Pond C-1 (Table 13). A review of groundwater manganese and conductivity

records indicates that Pond C-1 does not appear to have impacted groundwater for these constituents (Kerr McGee, 1996b). In addition, C-1 is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 12 for the location of Pond C-1 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.3.2 LOU #21 Pond Mn-1 and Associated Piping

Pond Mn-1 is a double-lined surface impoundment and has leak detection between the liners. The top liner is 60-mil high-density polyethylene (HDPE) and the bottom liner is 4 to 6 inches of compacted bentonite clay with a permeability of 10^{-6} centimeters per second (Kleinfelder, 1993). Mn-1 has a surface area of 1.22 acres (53,000 ft^2). The manganese pond was placed in operation in May 1983 and received non-hazardous process water wastes, including filter wash water and cathode wash water. The pond contents contain manganese as well as high TDS (Kleinfelder, 1993). Based on groundwater data in the area, Mn-1 does not appear to be contributing to groundwater impacts in the area (Kerr-McGee, 1996b). This pond is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Table 13 for analytical information and Plate 12 for the location of pond Mn-1 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.3.3 LOU #22 and #23 Ponds WC-West (WC-1) and WC-East (WC-2) and Associated Piping

Ponds WC-West (WC-1) and WC-East (WC-2) are both double-lined process water surface impoundments. These ponds were constructed within the former Trade Effluent settling pond area. The bottom liner of WC-West is 40-mil HDPE and the upper liner is 60-mil HDPE, with two leak detection wells between the liners. The bottom liner of WC-East is 40-mil HDPE, the middle liner is 60-mil HDPE, and the top liner is 40-mil HDPE. The current top liner was installed as an ultraviolet (UV) protective liner because the original top liner (now the middle liner) did not have sufficient carbon content to meet Kerr-McGee construction specifications. WC-East has two leak detection wells between the middle and bottom liners. WC-West has a surface area of 1.55 acres (67,600 ft^2) and WC-East has a surface area of 2.03 acres (88,580 ft^2). The soils beneath WC-West and WC-East were sampled for volatile organic compounds (VOCs) and eight RCRA metals prior to construction. Each analyte, except barium, was below the detection limit. This data is presented under LOU #1 on Table 26. Barium was detected at concentrations ranging from 0.1 to 1 mg/l (Kleinfelder, 1993). During the Phase I field investigation in 1993, a small spill was noted from the fittings on a Nalco process chemical container placed between the two ponds. An area of soil measuring approximately 5 feet by 10 feet appeared white and crusty (Kleinfelder, 1993). The soil stained with this material, reported to be sodium hypochlorite and other water treatment chemicals, was placed in WC-East (W-2). The NDEP required no further action for LOU #22. Please refer to Plate 12 for the location of

ponds WC-West (WC-1) and WC-East (WC-2) relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.3.4 LOU #32 Groundwater Remediation Unit

The groundwater remediation unit occupies an approximate area of 1,200 feet by 650 feet. It includes a line of groundwater interceptor wells, the GWTP, the groundwater barrier wall, two recharge trenches, and the GW-11 pond. The GWTP is located to the east of new D-1 building on a 60 foot by 20 foot concrete pad with containment curbing. In the early 1990s portions of the recharge trenches became plugged and required modifications. During this time treated water occasionally would emerge from the trenches' water elevation test wells and impact surface soils (Kerr-McGee, 1996b). This water contained iron oxide, which colored the affected area red. Although the trenches were refurbished, system modifications have resulted in the treated water being discharged to the GW-11 pond rather than placed into the recharge trenches. Please refer to Plate 12 for the location of LOU #32 relative to specific conductivity in groundwater and other potential chlorate and TDS source areas.

4.3.5 LOU #42 Unit 2 Salt Redler

The Salt Redler was a rubber belt conveyor and was located at the southeast corner of Unit 2. During the period of sodium chlorate production, transfer of salt from storage in Unit 2 to the conveyor feed hopper resulted in some salt spillage to the ground. Spilled salt was swept up and returned to Unit 2. The NDEP required no further action for LOU #42. Please refer to Plate 12 for the location of LOU #42 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.3.6 LOU #43 Unit 4 and 5 Basements

Sodium chlorate was produced in electrolytic cells located in Units 4 and 5. Additionally, these Units were used to produce sodium perchlorate at times. Both of these electrolytic processes contained chlorate and perchlorate as well as sodium dichromate (hexavalent chromium). The basements of Units 4 and 5 were used as sumps to collect spillage and wash water. Operation of the electrolytic cells in Units 4 and 5 was discontinued in the late 1990s, but the buildings and structures remain for future use. Removal of the impacted soil beneath these buildings would likely require destruction of each building. Portions of these buildings actively participate in the manufacturing process. Other portions of the buildings are in good condition and may be utilized for active manufacturing in the future. Some or all of this soil may be impacted with concentrations of perchlorate, chlorate, or chromium. Please refer to Plate 12 for the location of LOU #43 relative to groundwater specific conductivity and other potential chlorate and TDS source areas.

4.4 Chromium

Chromium was identified as a contaminant due to the historic use of chromium in the manufacturing processes on Site. Kerr-McGee has focused chromium remediation efforts on assessment, containment, and clean-up of the impacted groundwater downgradient from suspected source areas. Details regarding the groundwater remediation program progress have been provided in Section 3 of this report and updates are provided quarterly (for perchlorate) and semi-annually (for chromium) to NDEP. Table A-1 in Appendix A contains historic chromium analytical groundwater data. Please refer to Plate 10 for the location of the LOUs relative to chromium concentrations in groundwater.

4.4.1 LOU #7 and #8 Old P-2 and P-3 Ponds and Associated Conveyance Facilities

Surface impoundments were used to collect and concentrate dilute sodium chlorate solutions as part of the sodium chlorate production process. The concentrated solutions were recycled from the ponds back into the process. Old P-2 and P-3 were lined ponds historically used for this process from 1978 to 1986. Old P-2 encompassed approximately 0.1 acre (4,400 ft^2) and P-3 encompassed approximately 0.3 acre (13,000 ft^2). The ponds were constructed with single-layer synthetic liners. The ponds were taken out of service prior to 1987 and the remaining solids, liner, and underlying soils were removed and disposed at the U.S. Ecology waste disposal facility in Beatty, Nevada.

The Old P-2 and P-3 ponds were investigated in response to LOUs #7 and #8, the Old P-2 surface impoundment is identified as SWMU KMCC-010 in the Phase I ECA and the LOU (Kleinfelder, 1993 and NDEP, 1994).

During the Phase II ECA, sampling was conducted in the floor of these ponds consistent with the NDEP-approved work plan. Eight shallow soil borings, SB2-1 through SB2-8, were advanced in P-3 pond and five shallow borings, SB2-9 through SB2-13, were advanced in Old P-2 pond. Samples were collected at depths of 0 to 12 inches bgs and 24 to 36 inches bgs. Sample locations are shown on Plates 6 and 17. Prior to sampling, soil boring and sampling locations were selected using a random generation grid superimposed over the investigation area.

Surface soil samples were collected and analyzed for total chromium and soil pH. The analytical results of soil samples collected from the Old P-2 and P-3 ponds are presented in Table 8. Cross sections illustrating the impacts are presented on Plate 17.

With the exception of SB2-3, SB2-5, and SB2-6, the 0 to 12 inches deep samples in the boreholes contained total chromium above 100 milligrams per kilogram (mg/kg). Consequently, all 24 to 36 inches deep samples, with the exception of these locations, were

also analyzed for total chromium. In several areas (SB2-1, SB2-2, SB2-8, SB2-10, and SB2-11), the chromium concentrations from the 0 to 12 inch depths were above 1,000 mg/kg (Plate 17 and Figure 4). Generally, the subsequent analysis of the 24" to 36" deep samples indicated a decrease in total chromium concentration, with the exception of SB2-2 and SB2-8 in Old P-2 pond. The total chromium concentration in all samples from P-3 decreased with depth.

Based on these results, 10 additional soil borings (SB2-14 through SB2-24) were advanced (Figure 4 and Plate 17). Total chromium concentrations were below 100 mg/kg in samples collected from the borings located along the ponds' perimeters. These results indicated that soils impacted with chromium associated with Old P-2 and P-3 pond activities are primarily limited to the interior areas of the ponds.

For borings within the Old P-2 and P-3 pond interiors (SB2-14 through SB2-17), all of the deepest samples collected at the top of the capillary fringe contained less than 100 mg/kg total chromium, except for SB2-17, which was 100 mg/kg at a total depth of 33 feet bgs. Except for SB2-16, which had no total chromium detections exceeding 100 mg/kg, samples collected from the other three borings within the pond interiors (soil borings SB2-14, SB2-15, and SB2-17) encountered total chromium concentrations exceeding 100 mg/kg at varying depths. Among the samples collected from SB2-14, SB2-15, and SB2-17, total chromium concentrations in soil ranged up to a maximum of 540 mg/kg. The deepest total chromium detections exceeding 100 mg/kg, in SB2-14, SB2-15, and SB2-17, were 160 mg/kg, 100 mg/kg, and 100 mg/kg at depths of 30 feet, 27 feet, and 33 feet bgs, respectively. The groundwater capillary fringe was encountered at varying depths of 33 to 42.5 feet bgs.

Levels of pH were measured in soil samples from all Old P-2 and P-3 pond soil borings. The pH levels ranged from a low of 7.8 to a high of 10. The pH levels from the four borings within the Old P-2 and P-3 pond interiors ranged from a low of 8.1 to a high of 10.

Although factors influencing the mobility of chromium are complex, elevated pH values tend to retard the mobility of chromium, especially trivalent chromium (Allen, 1993).

Please refer to Plate 10 for the location of LOU #7 and #8 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.2 LOU #9 New P-2 Pond and Associated Piping

The New P-2 surface impoundment (pond) was initially constructed with two liners, a 30-mil un-reinforced PVC liner and a 36-mil reinforced polyester liner with a leak detection well between the two liners. Approximately 18 months later, an additional 60-mil HDPE liner was installed on top of the top liner. The pond was regulated under NPDES permit #NV0000078. Table 9 presents data from the groundwater wells upgradient and downgradient of this location. Kerr-McGee has focused remediation efforts on assessment, containment, and clean-up of the

impacted groundwater downgradient from this pond. This pond is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Details regarding the groundwater remediation program progress have been provided in Section 3 of this report and updates are provided quarterly (for perchlorate) and semi-annually (for chromium) to NDEP. Please refer to Plate 10 for the location of LOU #9 relative to chromium concentrations in groundwater and potential chromium source areas.

4.4.3 LOU #11 Sodium Chlorate Filter Cake Drying Pad area

The Filter Cake Drying Pad was used to dry particulate material removed from the sodium chlorate process. In the early 1990s a new tank containment system was constructed in the drying pad location. Before construction, the existing pad structure was demolished and the material generated was managed as hazardous waste (due to total chromium content of the upper surface) and appropriately disposed off Site. According to Alan Gaddy, a Kerr McGee employee who observed the demolition, discolored soil was removed and disposed with the concrete (Kerr-McGee, 1996b). This area is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 10 for the location of LOU #11 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.4 LOU #12 Hazardous Waste Storage Area

Waste from the sodium chlorate process was stored in a semi-dump trailer in preparation for TDSF, the hazardous constituent being hexavalent chromium. The waste was initially transferred from the process to the trailer by a front-end loader, but in the later years of operation the material was transferred by dumping from a collection bin into the trailer. The semi-dump trailer was periodically transported off Site to the TSDF. NDEP has indicated that no further action was required for LOU #12. This area is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 10 for the location of LOU #12 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.5 LOU #13 and #14 Ponds S-1 and P-1 and Associated Conveyance Piping

S-1 and P-1 ponds were single-lined surface impoundments used by the sodium chlorate process. The S-1 ponds footprint was approximately 47,500 $ft^{2.}$ The liner was constructed of 20-mil PVC on the bottom and 30-mil CPE on the sides (Kleinfelder, 1993). Pond P-1's footprint and liner were similar. The ponds were closed in 1983 and final closure was approved by the NDEP on December 5, 1985. During closure, approximately two feet of soil from each pond was also removed from the pond bottom and soil sampling and analysis was conducted to confirm adequate soil removal. Soil samples were analyzed by EP Toxicity methods and revealed concentrations of total soluble chromium between <0.02 mg/l and 0.11

mg/l (Tables 10 and 11). NDEP has indicated that no further action was required for LOUs #13 and #14. This area is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 10 for the location of LOU #13 and #14 relative to chromium concentrations in groundwater and other potential chromium source areas. Appendix D contains a diagram of the sample locations.

4.4.6 LOU #15 Platinum Drying Unit

The platinum drying unit was a 20 foot by 32 foot concrete-floored and concrete-bermed containment pad. In this area, a sodium perchlorate process byproduct which contained recoverable amounts of platinum was worked and platinum was recovered. In 1993 the pad concrete was sampled for metals using TCLP. The metals were below the method detection limit, with the exception of chromium samples (Table 12). The area was demolished and the concrete was transported to a hazardous waste TSDF. Soil under the pad was sampled for total chromium in 1994 (Table 12). This area is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 10 for the location of LOU #15 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.7 LOU #16 and 17 Ponds AP-1, AP-2 and AP-3 and Associated Transfer Lines

Ponds AP-1, AP-2 and AP-3 and the associated transfer lines were part of the AP manufacturing process. To evaluate potential chromium impacts, data from three existing monitoring wells, M-17, M-25, and M-89, were reviewed. Refer to Table 7 for the analytical results. The soil beneath these ponds was analyzed for chromium in 1993. Table 7 also presents the results of the TCLP analyses. Statistical guidelines were followed to determine the average concentrations of chromium. The average concentration of chromium in AP-1 was 3.13 mg/kg with a confidence interval of 0.45 mg/l. The average concentration of chromium in AP-2 was 2.80 mg/kg with a confidence interval of 0.88 mg/l (Kerr-McGee, 1996b). These ponds were not identified as a potential source of chromium, and therefore, are not on Plate 10.

4.4.8 LOU #28 Hazardous Waste Staging Area

The Hazardous Waste Staging Area was originally located north of Unit 2 and consisted of a 65 foot by 15 foot concrete pad segregated into four areas by concrete curbs. The staging pad area was constructed for compliance with RCRA requirements for staging material in anticipation of transport to a TSDF. It was used for both hazardous and non-hazardous waste staging, although the types were segregated. The wastes handled consisted of used oil, flammable wastes from parts washing, hexavalent chromium-contaminated material, and

miscellaneous compatible wastes. Material placed on these pads was contained in drums. During later construction projects, the staging pad and surrounding soil were removed to a depth of four feet. The soil removed had elevated levels of total petroleum hydrocarbons (TPH), as analyzed in October 1994. In November 1994 analysis of a soil composite sample from several locations in the bottom of the excavation was non-detect (<10 mg/kg) for TPH (Table 14) (Kerr-McGee, 1996b). This area is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 10 for the location of LOU #28 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.9 LOU #32 Groundwater Remediation Unit

The groundwater remediation unit occupies an approximate area of 1,200 feet by 650 feet. It includes a line of groundwater interceptor wells, the GWTP, the groundwater barrier wall, two recharge trenches, and the GW-11 pond. The GWTP is located to the east of the new D-1 building on a 60 foot by 20 foot concrete pad with containment curbing. In the early 1990s, portions of the recharge trenches became plugged and required modifications. During this time, treated water occasionally would emerge from the trenches' water elevation test wells and impact surface soils (Kerr-McGee, 1996b). This water contained iron oxide, which colored the affected area red. Although the trenches were refurbished, system modifications have resulted in the treated water being discharged to the GW-11 pond rather than being placed into the recharge trenches. Please refer to Plate 10 for the location of LOU #32 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.10 LOU #43 Unit 4 and 5 Basements

Sodium chlorate was produced in electrolytic cells located in Units 4 and 5. Additionally, these Units were used to produce sodium perchlorate at times. Both of these electrolytic processes contained chlorate and perchlorate as well as sodium dichromate (hexavalent chromium). The basements of Units 4 and 5 were used as sumps to collect spillage and wash water. Operation of the electrolytic cells in Units 4 and 5 was discontinued in the late 1990s, but the buildings and structures remain for future use. Removal of the impacted soil beneath these buildings would likely require destruction of each building. Portions of these buildings actively participate in the manufacturing process. Other portions of the buildings are in good condition and may be utilized for active manufacturing in the future. Some or all of the soils underlying Units 4 and 5 may be impacted with concentrations of perchlorate, chlorate, or chromium. Please refer to Plate 10 for the location of LOU #43 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.11 LOU #46 Former Old Main Cooling Tower and Recirculation Lines

The former old Main Cooling Tower was located north of the manganese dioxide process leach plant. It was approximately 50 feet high and 700 feet long. The tower was installed by the US government when the complex was originally constructed. It operated from 1941 to September 1989. Historically the old Main Cooling Tower experienced several recirculation water upsets, which resulted in discharge of high-conductivity water to the Beta ditch. Individual discharges varied from a few hours to several days. The estimated water discharge was reported to the NDEP along with analytical results for pH, conductivity, sodium chloride, zinc and phosphate. The NDEP required no further action for LOU #46. This area is upgradient of the on-Site groundwater interception system/groundwater barrier wall. Please refer to Plate 10 for the location of LOU #46 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.4.12 LOU #61 Old Sodium Chlorate Plant Decommissioning

The old Sodium Chlorate Plant was located in Units 4 and 5. Production occurred in 1,300 electrolytic cells from 1945 to 1989. The process liquids contained primarily sodium chlorate with sodium dichromate as a process chemical additive. Retention of process liquids in the basements and sump areas of Units 4 and 5 was identified as a potential source of chromium in groundwater. The electrolytic cells and associated piping were emptied. Residual materials, including the cell shells and other materials which were hazardous due to the hexavalent chromium concentration, were transferred to a hazardous waste TSDF in Beatty, Nevada. The process equipment (e.g.. tanks, pipes and pumps) was dismantled in 1991 and transported off-Site for disposal or recycling. The building area was cleaned and made available for other uses. The NDEP required no further action for LOU #61. Please refer to Plate 10 for the location of LOU #61 relative to chromium concentrations in groundwater and other potential chromium source areas.

4.5 Manganese

Manganese was identified as a potential contaminant due to the documented groundwater impacts and the historic use of manganese in the manufacturing processes on Site. Kerr-McGee has focused groundwater remediation efforts on assessment, containment, and clean-up of the impacted groundwater downgradient from suspected source areas. Details regarding the groundwater remediation program progress have been provided in Section 3 of this report and are primarily focused on perchlorate and chromium. Please refer to Plate 13 for the location of the LOUs relative to manganese concentrations in groundwater. Table 15 contains a summary of manganese analytical data from groundwater wells.

4.5.1 LOU #21 Pond Mn-1 and Associated Piping

Pond Mn-1 is a double-lined surface impoundment and has leak detection between the liners. The top liner is composed of 60-mil HDPE and the bottom liner is 4 to 6 inches of compacted bentonite clay with a permeability of 10^{-6} centimeters per second. Mn-1 has a surface area of 1.22 acres (53,000 ft^2). The Mn-1 surface impoundment was put into operation in May 1983 and received non-hazardous liquid wastes, including manganese dioxide cell fed filter waste and potassium phosphate cathode wash water. The wastewater contains high TDS (Kleinfelder, 1993). Based on groundwater data in the area, Mn-1 does not appear to be contributing to groundwater impacts in the area (Kerr-McGee, 1996b). Please refer to Table 13 for analytical information and Plate 13 for the location of this pond relative to manganese concentrations in groundwater and other potential manganese source areas.

4.5.2 LOU #24 and #34 Leach Beds, Associated Conveyance Facilities and Former Manganese Tailings Area

Prior to 1975, tailings from the beneficiation of manganese dioxide ores were transported as a slurry to unlined surface impoundments/leach beds to the west of the current tailings area. After 1975, filtering of the tailings yielded a semi-dry filter cake. The tailings pile was graded periodically to maintain the desired shape and drainage. Placement of demolition debris into the tailings pile was allowed by NDEP (Kleinfelder, 1993). The tailings were analyzed by EP toxicity in 1979 and by TCLP in 1990 and 1993, and were determined to be non-hazardous. Evaluation of data from monitor wells in the area show that there is no significant manganese impact to groundwater in the vicinity of the tailings (Kerr-McGee, 1996b). Please refer to Table 16 for groundwater and TCLP analytical information and Plate 13 for the location of this area relative to manganese concentrations in groundwater and other potential manganese source areas.

4.5.3 LOU #44 Unit 6 Basement

High-purity, battery-active manganese dioxide has been produced in electrolytic cells in Unit 6. The basement beneath the cells collected process spillage and wash water and was identified as a source of soil and groundwater impact. Several groundwater monitor wells near Unit 6 are used to monitor manganese concentrations; these are M-10, M-29, and M-77, both up- and downgradient from Unit 6. Remediation measures were undertaken in 1986. The basement was cleaned, the concrete floor was removed, and the subsurface soil was re-contoured. The basement was lined with a 100-mil HDPE liner. The integrity of the basement liner system is periodically checked and serviced. Please refer to Table 17 for groundwater analytical information and Plate 13 for the location of this building relative to manganese concentrations in groundwater and other potential manganese source areas.

4.5.4 LOU #47 Leach Plant Area Manganese Ore Piles

Manganese ore has been stored and processed at the Site since 1951. Historically, manganese ore piles were 10 feet to 15 feet high and over 300 feet long. The manganese ore was normally crushed, with particles varying in size but typically 0.25 inch and smaller. An industrial hygiene program is ongoing and eight-hour time-weighted averages for manganese dust exposures have been developed for workers in different settings within the process. An operator turning the roaster piles was exposed to 1.74 milligrams per cubic meter (mg/M^3) total dust. A maintenance technician in the general area of the plant was exposed to 0.058 mg/M^3 total dust. The dust is composed of 55 percent by weight of manganese dioxide. Table 18 presents the analysis of the manganese dioxide ore. Please refer to Plate 13 for the location of LOU #47 relative to manganese concentrations in groundwater and other potential manganese source areas.

4.5.5 LOU #48, #49, #50, and #51 Leach Plant Process Equipment

A variety of process equipment is used to beneficiate the manganese dioxide ore and produce high-quality, battery-grade manganese dioxide. The analyte tanks are housed within a containment berm and are used to hold a manganese sulfate solution, that was used in the Unit 6 electrolytic cells, until the used solution is fortified and returned to the electrolytic cells. The sulfuric acid tank is housed on a containment pad and is used to hold this process chemical until needed by the process. The leaching tanks are housed on containment pads and are used to leach the manganese dioxide ore to gain its manganese value for use in the Unit 6 electrolytic cells. An analysis of the appropriateness of wells in the vicinity of the analyte tanks was completed and the results submitted to NDEP in the October 1996 Response to Letter of Understanding. Analysis of groundwater impacts including manganese concentrations, pH and specific conductivity is ongoing (Table 19). Please refer to Plate 13 for the location of LOUs #48, 49, 50 and 51 relative to manganese concentrations in groundwater and other potential manganese source areas.

4.6 Boron

Boron was identified as a potential contaminant due to the historic use of boron in the manufacturing processes on Site.

4.6.1 LOU #20 Pond C-1 and Associated Piping

The C-1 pond was constructed and lined with a single 60-mil PVC liner. C-1 pond covered 1.58 acres (69,000 ft^2). The pond was used to evaporate non-hazardous process water. Four groundwater monitor wells are monitored in the vicinity of pond C-1 (Table 13). A review of groundwater manganese and conductivity records indicates that pond C-1 does not appear to

have impacted groundwater (Kerr-McGee, 1996b). Please refer to Table 13 for analytical information and Plate 15 for the location of LOU #2)...

4.7 Hydrocarbons

Hydrocarbons were identified as a potential contaminant due to the historic use of hydrocarbons on Site.

4.7.1 LOU #4 Hardesty Chemical Site

Hardesty Chemical Company (Hardesty) leased property in the vicinity of Unit 2 (as well as elsewhere in the BMI complex) in September 1945. In 1947, AMECCO gave notice that it had purchased the Hardesty interest in the BMI complex, and it appears AMEECO ceased operations prior to June 1949. Products listed for proposed production included muriatic acid, synthetic hydrochloric acid, monochlorobenzene, paradicyhlorobenzene, orthodichlorobenzene, DDT, and soda arsenite solution. A portion of the Hardesty area was later leased by J. B. Kelley, Inc.

Drawings of the facility indicate that there were two underground storage tanks (USTs) located to the north of Unit 2, one for kerosene and one for benzene. A tank farm was also located north of Unit 2 on the north side of the tracks. None of these tanks are currently present.

A groundwater monitoring well (M-97) was installed downgradient from the tank farm and former USTs in 1997 (Plate 14). The borehole was advanced to a total depth of 50 feet bgs and samples were collected every five feet for lithologic logging and control. The borehole was converted to a well. Based on the substances historically used at the Hardesty site, the groundwater was sampled and analyzed for VOCs, semi-volatile organic compounds (SVOCs), specific conductance, TPH, pH, and arsenic by EPA Methods 8240, 8270, 8015M-diesel, 9045, and 6010/7000 and SW-846 9045, respectively (Table 20).

Analyses indicate that TPH was not detected at the practical quantitation limit (PQL). Arsenic was detected at 0.124 mg/l, which is within the expected range. Analysis indicates that 7.8 μg/l of Di-n-butylphthalate is an estimated concentration below the laboratory PQL. The VOC analysis indicated the presence of chloroform (18 μg/l) and acetone (3.1 μg/l). The analysis for acetone showed an estimated concentration because it was below laboratory PQL. Acetone was also detected in the laboratory method blank. Groundwater monitoring well M-97 has also been monitored from 1999-2004 for pH, specific conductivity, total chromium, and perchlorate levels (Table 20).

In summary, the constituents of concern were either not detected, were detected at low levels as a result of laboratory procedures, or were not representative of adverse environmental conditions. This indicates that the former USTs at the Hardesty site have not impacted

groundwater. Please refer to Table 20 for analytical information and Plate 14 for the location of this area relative to other potential TPH source areas.

4.7.2 LOU #28 Hazardous Waste Storage Area

A hazardous waste staging area was originally located north of Unit 2 and consisted of a 65 foot by 15 foot concrete pad segregated into four areas with concrete curbing. The staging pad area was constructed for compliance with RCRA requirements and used for both hazardous and non-hazardous waste staging, although the types were segregated. The wastes handled consisted of used oil, flammable washing wastes, hexavalent chromium-contaminated material, and miscellaneous compatible wastes. Material placed on these pads was contained in drums. During later construction projects, the staging pad and surrounding soil was removed to a depth of four feet. The soil removed had elevated levels of TPH, as analyzed on October 1994 (Table 14). In November 1994 analysis of a soil composite sample from several locations in the bottom of the excavation was non-detect (<10 mg/kg) TPH (Table 14) (Kerr-McGee, 1996b). Please refer to Plate 14 for the location of this area relative to other potential TPH source areas.

4.7.3 LOU #39 A.P. Satellite Accumulation Point - AP Maintenance Shop

Visibly stained soil resulting from a minor spill from a used oil drum was observed in the AP satellite accumulation point-AP maintenance shop during a Phase I investigation. This area was investigated in response to LOU #39 (SWMU KMCC-029) (Plates 6 and 14).

Visibly affected soil was removed and a surface soil sample, S8-1S was collected and analyzed by TPH fuel fingerprint methods to verify whether the TPH-affected soil had been successfully removed (Table 21). The sample results indicated that 180 mg/kg diesel and 1,500 mg/kg motor oil constituents remained in the soil. TPH as gasoline was not detected above the laboratory PQL of 29 mg/kg.

Additional soil was removed from the area and containerized in a Department of Transportation (DOT) approved drum. A second confirmation sample (S8-1RE) was collected from the bottom of the excavated area. The sample analytical result was non-detect (<31 mg/kg) for TPH in the diesel-range.

In summary, the removal of soil from the AP Satellite Accumulation Point-AP Maintenance area effectively remediated the area and the subsequent sampling analysis confirmed that no diesel-range organics above laboratory detection limits remain in this area. Please refer to Plate 14 for the location of this area relative to other potential TPH source areas.

4.7.4 LOU #41 Unit 1 Tenant Stains

Unit 1 Tenant stains were investigated as part of the 1997 Phase II ECA field investigation. Visibly stained soils were removed and transported to Environmental Technologies TSDF in Beatly, Nevada. A surface soil sample, S9-1S, was collected and submitted for TPH fuel fingerprint analysis (Table 22). Analytical results indicated that TPH in the range of motor oil was detected at a concentration of 250 mg/kg. TPH in the diesel range was quantified at 73 mg/kg and TPH in the gasoline range was not detected above the PQL of 29 mg/kg. Additional soils were removed from the area with the use of a backhoe. The area was re-sampled. A confirmation soil sample (S9-1RE) from the bottom of the excavation contained 100 mg/kg of TPH heavier than diesel, which is below the NDEP action level. Please refer to Plate 14 for the location of this area relative to other potential TPH source areas. Well samples from M-92 and M-93 were also analyzed in 1993 to investigate potential groundwater TPH impacts from these stained areas. Data in Table 22 indicates TPH and benzene, toluene, ethylbenzene and xylenes (BTEX) concentrations were non-detect.

4.7.5 LOU #45 Diesel Fuel Storage Tank

The former diesel fuel storage above-ground storage tank (AST) located south of old P-2 pond was removed by Kerr-McGee in 1994 (Plates 6 and 14). Samples were collected for analysis from seven soil borings (SB5-1 through SB5-7) and two groundwater monitor wells (M-10, M-21, and SB5-5 a temporary well). The samples were analyzed for diesel components (TPH-d) by EPA Method 8015M-diesel, BTEX by EPA method 8020, and polychlorinated biphenyls (PAHs) by EPA Method 8270. The soil and groundwater analytical results are presented in Table 23.

The NDEP has published cleanup standards for hydrocarbon-contaminated soil; the established level for TPH-d is 100 mg/kg. Soil samples from boreholes SB5-1, SB5-2 and SB5-3 contained TPH-d at concentrations greater than 100 mg/kg. Soil samples from the other boreholes did not contain TPH-d at concentrations exceeding 100 mg/kg. In addition, soil samples from borings SB5-4, SB5-5, SB5-6, and SB5-7 encountered no detectable concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) or polynuclear aromatic hydrocarbon (PAH) (Plate 17 and Table 23).

Two existing monitoring wells were sampled and analyzed for diesel constituents. Well M-21 is located in the regional downgradient direction and M-10 is located upgradient. Analytical results obtained in 1997 indicated that TPH concentrations in both samples were less than the PQL of 1.0 mg/l. In 1999 the groundwater was investigated again. Analytical results indicate that TPH-d concentrations were either at very low levels in a groundwater sample taken from soil boring (converted into a temporary groundwater well) SB5-5 (13 mg/l), or non-detect in groundwater from M-21 approximately 50 feet downgradient. The results of the sample

analysis for M-21 conducted during the Supplemental Phase II ECA sampling are consistent with the non-detectable results of groundwater samples collected from monitoring well M-21 in April 1997. These data confirm that groundwater has only been minimally impacted beneath the former diesel fuel storage tank area, and not impacted at all immediately downgradient of this area. Please refer to Plate 14 for the location of this area relative to other potential TPH source areas.

4.7.6 LOU #63 J.B. Kelley, Inc. Trucking Site

J.B. Kelley, Inc. leased property from Kerr-McGee immediately south and east of the truck unloading area and operated a trucking operation on Site. The company hauled commodities such as lime and soda ash. The area of interest at the J.B. Kelley, Inc. site included a UST that stored diesel (excavated in 1991) and the open concrete vaults which formerly served as foundations for peat storage buildings (Plate 6 and 14).

In 1992 Horn Environmental Consulting Group on behalf of JB Kelley, Inc. conducted a field investigation to close a UST on their facility. In doing so they sampled six borings surrounding the UST at depths of 15, 25, 35, and 37 (at the groundwater interface) feet bgs. In addition, a water sample was taken from existing groundwater well H-38. The soil samples were analyzed for TPH (diesel and gasoline range by EPA Method 8015M) and the groundwater sample for total organic carbon (TOC). The TPH results were non-detect (<10 mg/l) and the TOC was 3.3 mg/l. Table 24 presents the soil and groundwater analytic data.

In March 1992, the groundwater well H-38 was re-sampled to provide BTEX and TPH data for the Clark County Health District. Benzene and Ethylbenzene were present at concentrations of 0.048 mg/l and 0.114 mg/l, respectively (Table 24). TPH both for diesel and gasoline range were non-detect.

In May 1993, Kerr-McGee installed two groundwater monitor wells (M-92 and M-93) to evaluate the groundwater quality on the J.B. Kelley site. M-92 is located upgradient, due south from the UST excavations conducted by J.B. Kelley. M-93 is located approximately 100 feet downgradient from the diesel UST excavation. Following development of the groundwater wells, water samples were collected and analyzed for TPH and BTEX. All results were non-detect (Table 24).

Concerning the open concrete vaults, because materials could potentially migrate through cracks in the concrete vault floor, in 1997 one shallow boring (SB7-1-1) was advanced through a crack in the floor and a soil sample was collected immediately beneath the concrete. Samples were also collected of sand that accumulated within each of the eight vaults. From these samples, a composite "soil" sample was produced, S7-1-S. The samples were analyzed for total metals by EPA Method 6010/7000, soil pH by SW-846 Method 9045, TPH by EPA

Method 8015M-diesel, and VOCs by EPA Method 8240. The analytical results are presented on Table 24.

Toluene was detected at 1.1 μg/kg in sample S7-1-S. Sample SB7-1-1 contained 1.6 μg/kg of trichloroethane (TCA) and 13 μg/kg of acetone. These analyses were qualified by the laboratory. The concentrations of toluene and TCA were estimated since they were below the laboratory PQL. Acetone was detected in a method blank.

The results of total metal analyses indicate that all constituents were detected at concentrations within the range of average background concentrations in Western U.S. soils. The total chromium concentration in the surface soil sample collected by compositing remnant sands from the bottom of each vault was 42.9 mg/kg. While this concentration is slightly elevated, it is still below the range of average background concentrations, indicating that chromium is not at concentrations likely to represent an environmental concern.

Both samples were non-detect for TPH at the designated laboratory PQL. Based on the analytical results of the soil samples collected, the former J.B. Kelley Trucking operation has not affected surface and subsurface soil. Please refer to Table 24 for the analytical results and Plate 14 for the location of this area relative to other potential TPH source areas. Appendix D contains a sketch of the sample locations.

4.7.7 LOU #64 Koch Materials Company Site

Koch Materials Company leased an area west of the diesel storage tank for use as an asphalt emulsion batch plant. TPH spills were evident at the leased property and Koch removed visibly stained soils. They also collected soil samples for VOCs, SVOCs, metals, and confirmatory TPH analysis. Please refer to Table 25 for analytical data and Plate 14 for the location of this area relative to other potential TPH source areas. Appendix D contains a figure of the sample locations.

4.7.8 LOU #65 Nevada Pre-cast Concrete Products, Green Ventures International, Buckles Construction Company, and Ebony Construction Sites

Nevada Pre-Cast Concrete utilized office space near the J.B. Kelley operations from January 1973 to May 1978. Only office activities were conducted by Nevada Pre-cast Concrete (Kleinfelder, 1993). Green Ventures International leased the S-1 change house from August 1980 to September 1981 for use as a marketing office for alfalfa sprouts. Only office activities were conducted by Green Ventures International (Kleinfelder, 1993). Buckles Construction Company leased a portion of Unit 1 from August 1973 to June 1989. Buckles Construction Company activities, including steel fabrication and equipment storage, were conducted in the

crane bay located in the northwest corner of Unit 1 in the crane bay. In 1993, groundwater monitoring wells M-92 and M-93 were sampled for TPH and BTEX constituents to investigate possible groundwater impacts resulting from surrounding operations. All results from this analysis were non-detect (Table 22). In the LOU the NDEP asked if the Unit 1 tenant stains were associated with any of these activities. Unit 1 Tenant stains were investigated in response to LOU #41 (above). As part of the 1997 Phase II ECA effort, visibly stained soils were removed and transported to an appropriate disposal facility. A surface soil sample (S9-1S) was collected and submitted for TPH fuel fingerprint analysis (Table 22). Analytical results indicated that TPH in the range of motor oil, was detected at a concentration of 250 mg/kg. TPH in the diesel range was quantified at 73 mg/kg and TPH in the gasoline range was not detected above the PQL of 29 mg/kg.

Additional soils were removed from the area and the area was re-sampled. A confirmation soil sample (S9-1RE) from the bottom of the excavation contained 100 mg/kg of TPH heavier than diesel, which is below the NDEP action level. Please refer to Plate 14 for the location of these areas relative to other potential TPH source areas.

4.7.9 LOU #66 Above Ground Diesel Storage tank leased by Flintkote

Flintkote Company leased a diesel AST from July 1973 through 1975. The tank was located near the southwest corner of the Chemstar property. The tank has been removed. The NDEP required no further action for LOU #66. Please refer to Plate 14 for the location of this area relative to other potential TPH source areas.

4.7.10 LOU #68 Southern Nevada Auto Parts Site

Nevada Pick-a-Part, formerly Southern Nevada Auto Parts, leased property to store wrecked, impounded and repossessed vehicles. Operations included allowing the public to remove parts from the vehicles for a fee. Stained soil was evident in some leased areas. Kerr-McGee worked with the lessee to implement practices to minimize the potential for impacts to soil or groundwater to occur. Please refer to Plate 14 for the location of this area relative to other potential TPH source areas.

4.8 Miscellaneous

The miscellaneous category of contaminants was identified to group LOUs that exhibited traits or included historic operations that may have impacted soil or groundwater, but the specific chemical or chemicals of concern did not appear to be widespread.

4.8.1 LOU #1 Trade Effluent Settling Ponds

The Trade Effluent (TE) settling pond area is located north of the ammonium perchlorate storage area and west of the existing ponds, WC-East and WC- West (Plate 16). The TE ponds were operated by the U.S. government from the fall of 1942 to fall 1944 as unlined storage impoundments for acid waste neutralized with caustic liquor. The waste was apparently evenly distributed in the ponds, with no segregation of materials in different areas. Each TE pond was approximately 20 acres and the average liquid depth was 7.5 feet.

The TE Ponds were investigated in response to LOU #1 (SWMU KMCC-014). After decommissioning, portions of the TE pond area have been utilized for other activities. Kerr-McGee constructed and operated a hazardous waste landfill in the northwestern portion of the TE pond area between 1980 and 1983. The landfill was closed and capped in 1985 in accordance with RCRA interim status requirements and is currently under a post-closure monitoring program. In October 1988, double-lined surface impoundments WC-East and WC-West were constructed in the northeastern portion of the TE pond area. WC-East and WC-West are permitted by the NDEP and are currently in operation.

In 1987, prior to installation of the double-lined surface impoundments, two soil borings were drilled in the vicinity of the closed landfill (Holes 1 and 2), and nine samples were collected and analyzed. Analysis included metals by method 6010, soil pH by EPA Method 9045, pesticides by EPA Method 608, and Silvex Analyses by EPA Method 615 (Table 26). All results were non-detect except for Barium, with results ranging between 0.10 mg/l and 1.0 mg/l

In 1997, soil sampling was conducted in this area consistent with an NDEP approved work plan. Boring locations were selected by a random generation grid placed over the area of historical use and advanced to a total depth of 10 feet bgs. In order to characterize the potential remnants of the neutralized aqueous waste historically conveyed to the ponds, soil samples were collected at depths of 1, 5, and 10 feet bgs. Soil borings SB1-1 and SB1-2 were located in the area of concern due south of the TE ponds (Plate 6). Five soil borings, SB1-3 through SB1-7, were advanced in the area between the closed landfill and surface impoundments. Soil samples collected from the TE settling ponds were analyzed for eight RCRA metals by EPA Method 6010 and for soil pH by SW-846 Method 9045. Analytical results from samples collected at LOU #1 are contained in Table 26. In summary, metal concentrations were below detection limits, with the exception of barium, which was detected at concentrations of less than or equal to 1 mg/l.

Analytical results of soil samples collected from the TE ponds indicate that metal concentrations in soil samples are within the range of the average concentration of these constituents in soils (ASTM, 1995). Confirmation that these average ranges are applicable to the geographic area within which the facility is sited will be an element included in the

Background Study Work Plan intended for 2005. The range of soil pH within the boring samples is from 8.2 to 9.8. The expected range of pH for soils in a desert environment is 8 to 9, but it is not unusual for pH to range from 7 to 11 (Boul, S.W.,1973). This will be confirmed during the Background Study to be completed in 2005. Please refer to Table 26 for analytical results and to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.2 LOU #2 Open Area due South of Trade Effluent Settling Ponds

LOU #2 was investigated concurrently with LOU #1, which is discussed above in Section 4.8.1. Soil borings SB1-1 and SB1-2 were located in the area of concern due south of the TE ponds (Plate 6). Analytical results of soil samples collected from the TE ponds indicate that metal concentrations in soil samples were within the range of the average concentration of these constituents in soils (ASTM, 1995). The samples' range of soil pH is from 8.2 to 8.9, which is within the expected range of desert soil. The results of analysis are presented in Tables 27 and 26. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.3 LOU #3 Air Pollution Emissions Associated with Industrial Processes

In 1997, air emissions from the Kerr-McGee facility were analyzed to determine the patterns of dispersion and probable deposition of emissions. Emission estimates were developed as part of the Title V Federal operating permit and were based on source test data as well as EPA approved emission factors (AP-42). The results of air modeling were included in the October 1996 Kerr-McGee report. In summary, the maximum calculated deposition is 17 grams per square meter (g/m^2) at a point on the eastern boundary of the plant. This reflects the predominantly southwestern wind direction. At other points along the Kerr-McGee plant boundary, the calculated deposition is significantly less; along over 80 percent of the boundary the deposition is less than 1 g/m^2.

4.8.4 LOU #5 On-Site Portion of Beta Ditch Including the Small Diversion Ditch

The Beta Ditch could have carried a wide variety of chemicals throughout its history. This ditch was investigated during the 1996 Phase II ECI (ERM, 1996). Soil samples were analyzed for VOCs, SVOCs, pesticides/ PCBs, metals, cyanide, chlorate, pH, asbestos and radionuclides. Table 28 summarizes the analytical results. Of the 41 individual VOCs analyzed under the EPA Method 8260, only four were detected at relatively low concentrations on Site. Of the 66 individual SVOCs analyzed under EPA Method 8270 only four were detected at relatively low concentrations on Site. Of the 28 constitutes analyzed for pesticides/PCBs only four were detected on Site. Please refer to Table 28 for analytical results and Plate 16 for the location of

this area relative to other potential miscellaneous source areas. Appendix D contains a figure of the sample locations.

4.8.5 LOU #6 Unnamed Drainage Ditch Segment

This ditch is also referred to as the Northwest Drainage ditch and was used by more than one BMI company. Soil in the area was sampled in 1993. Eight surface soil samples were collected from 0-1 foot bgs. Three samples were collected in the ditch and the other eight were collected from areas adjacent to the ditch. Three additional samples were collected from the 4-5 foot depth interval. No significant concentrations of contaminants of concern were identified (Table 29). In 1994, two nearby groundwater wells were sampled for VOCs by method 8240, metals by method 6010, and PCBs by method 608, see Table 29 for details. In addition, an extensive series of borings and sampling was conducted along the Warm Springs Road Extension in March 1996. A total of 45 soil samples were obtained. Analyses on numerous samples included metals by EPA Method 6010, chlorinated pesticides and PCBs by method 8080, VOCs by method 8260, SVOCs by method 8270, bulk asbestos, and radionuclides by various analyses. Please refer to Table 29 for analytical data and Plate 16 for the location of this area relative to other potential miscellaneous source areas. Appendix D contains a figure of the sample locations.

4.8.6 LOU #10 On-Site Hazardous Waste Landfill

This landfill was closed consistent with the approved closure and post closure plans. Groundwater analytical data for monitoring wells nearby are shown in Table 30. In a letter dated January 17, 1986 the NDEP approved the landfill closure. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.7 LOU #15 Platinum Drying Unit

The platinum drying unit was a 20 foot by 32 foot concrete-floored and concrete-bermed containment pad. In this area, a sodium perchlorate process byproduct which contained recoverable amounts of platinum was worked and platinum was recovered. In 1993 the pad concrete was sampled for metals using TCLP. The metals were below the method detection limit, with the exception of chromium (Table 12). The area was demolished and the concrete was transported to a hazardous waste TSDF. Soil under the pad was sampled for total chromium in 1994. The three chromium samples were between 17.9 and 50.7 ppm (Table 12). Please refer to Plates 10, 11 and 16 for the location of LOU #15 relative to groundwater impacts and other potential source areas for perchlorate, chromium and miscellaneous chemicals.

4.8.8 LOU #16 and #17 Ponds AP-1, AP-2 and AP-3 and Associated Transfer Lines

As well as being areas where other chemicals were present, ponds AP-1, AP-2 and AP-3 were identified by the NDEP as potential sources of nitrate. Three existing monitoring wells, M-17, M-89, and M-25, were sampled and analyzed for nitrates. Well M-17 is located immediately upgradient of the ponds, and M-89 and M-25 are situated in the downgradient groundwater flow direction. The samples were analyzed for nitrates by EPA Method 300 (Table 7).

The nitrate analysis was conducted by ion chromatography and the laboratory results were presented in terms of elemental nitrogen. The chromatograph was re-examined and the retention time peaks separated for nitrate/nitrite. Virtually no nitrite was present in the samples; the sample results are presented in terms of equivalent concentration of elemental nitrogen. Please refer to Table 7 for the analytical data and Plate 16 for the location of this area relative to other potential miscellaneous source areas. Nitrate is removed from treated groundwater in the ongoing remedial activities associated with the Site.

4.8.9 LOU #18 Pond AP-4

Surface Impoundment AP-4 was double-lined and had leak detection between the liners. Although no groundwater wells were specifically constructed to monitor groundwater beneath this impoundment, groundwater monitoring occurs upgradient and downgradient in the area (Table 7). Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.10 LOU #19 Pond AP-5

Surface Impoundment AP-5 is double-lined and has leak detection between the liners. Although no groundwater wells were specifically constructed to monitor groundwater beneath this impoundment, the groundwater is monitored upgradient and downgradient in the area (Table 7). Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.11 LOU #22 and #23 Ponds WC-West and WC-East and Associated Piping

Ponds WC-West (WC-1) and WC-East (WC-2) are both double-lined process water surface impoundments. They were constructed within the former Trade Effluent settling pond area. For WC-West, the bottom liner is composed of 40-mil HDPE and the upper liner is composed of
60-mil HDPE with leak detection between the two liners. For WC-East the bottom liner is composed of 40-mil HDPE, the middle liner is 60-mil HDPE, and the top liner is 40-mil HDPE. The current top liner was installed as a UV protective liner because the original top liner (now the middle liner) did not have sufficient carbon content to meet Kerr-McGee construction

specifications. WC-West has a surface area of 1.55 acres (67,600 ft^2) and WC-East has a surface area of 2.03 acres (88,580 ft^2). The soil beneath WC-West and WC-East was sampled for VOCs and eight RCRA metals prior to construction. A small spill occurred from the fittings on a Nalco container placed adjacent to WC-East. The soil stained with this material, reported to be sodium hypochlorite and other water treatment chemicals, was placed in WC-East pond (WC-2). Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.12 LOU #25 Process Hardware Storage Area

The process hardware storage area is located between Units 1 and 2. The area is about 50 feet wide and 200 feet long and was used to store process hardware since 1989. The process hardware stored in this area consisted of scrap metal parts and equipment from decommissioning of the former sodium chlorate and perchlorate processes from Units 4 and 5. Parts, tanks and other equipment destined for this storage area were rinsed or otherwise decontaminated prior to placement on the pad. The NDEP required no further action for LOU #25. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.13 LOU #26 Trash Storage Area

The trash storage area is located north of Units 1 and 2. The area consists of two asphalt- surfaced areas measuring approximately 56 feet by 100 feet and 65 feet by 50 feet. Common trash from the sodium chlorate and sodium perchlorate processes was placed in 55-gallon drums and delivered to this staging area. The area was used from approximately 1990 to closure of the sodium chlorate process. The drums were inspected, sealed, labeled ”non-hazardous waste” and shipped to the U.S. Ecology landfill in Beatty, Nevada. The drums were shipped to Beatty as a precautionary measure. The NDEP required no further action for LOU #26. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.14 LOU #27 PCB Storage Area

The PCB storage area is located in the northern portion of Unit 2. The PCB storage area consists of three 12 foot by 15 foot vaults with floors that are 12 inches lower than the surrounding area. The vault walls are concrete that is 8 inches thick and the floors are covered with black 6-mil plastic sheeting. The vault area was reserved as a PCB waste staging areas. The USEPA conducted an inspection of the PCB storage area in 1989 and stated that no problems were noted. The NDEP required no further action for LOU #27. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.15 LOU #28 Hazardous Waste Storage Area

The Hazardous Waste Staging Area was originally located north of Unit 2 and consisted of a 65 foot by 15 foot concrete pad segregated into four areas with concrete curbing. The staging pad area was constructed for compliance with RCRA requirements and used for both hazardous and non-hazardous waste staging, although the types were segregated. The wastes handled consisted of used oil, flammable maintenance parts washing wastes, hexavalent
chromium-contaminated material, and miscellaneous compatible wastes. Material placed on these pads was contained in drums. During later construction projects, the staging pad and surrounding soil was removed to a depth of four feet. The soil removed had elevated levels of TPH, as analyzed in October 1994. In November 1994 analysis of a soil composite sample from several locations in the bottom of the excavation was non-detect <10 mg/kg for TPH (Table 14) (Kerr-McGee, 1996b). Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.16 LOU #29 Solid Waste Dumpsters

The solid waste dumpsters were located south of Unit 4 across from Avenue H. They consisted of open metal dumpsters placed on concrete surfaces separated by areas of gravel-covered soil. The area is about 220 feet by 70 feet. Two dumpsters have routinely been in place - one for recyclable steel and the other for common trash. At times other non-ferrous metal recycle dumpsters were staged for recycle of other than steel material. Scrap metal was washed prior to delivery to this area. The area was used since 1980. The NDEP required no further action for LOU #29. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.17 LOU #32 Groundwater Remediation Unit

The groundwater remediation unit occupies an area approximately 1,200 feet by 650 feet. It includes a line of groundwater interceptor wells, the groundwater barrier wall, and two recharge trenches. The groundwater treatment unit is also in the area on a 60-foot by 20-foot concrete pad. Portions of the recharge trenches became plugged and required modifications. At times treated water was discharged to near surface soils due to pipeline plugging (Kerr-McGee, 1996b). System modifications have been implemented and treated water is no longer delivered. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.18 LOU #33 Sodium Perchlorate Platinum By-product Filter

The platinum recovery filter press was located on a 75 foot by 100 foot concrete pad, to the east of the Unit 5 cell floor. The pad was equipped with a sump that collected and contained

liquids, including process liquids and wash down water. Cracks in the floor, noted during the Phase I investigation, were coated with a Chevron industrial membrane material that provided a continuous cover over the floor (Kerr-McGee, 1996b). Analysis of groundwater impacts is ongoing. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.19 LOU #35 Truck Unloading Area

The truck unloading area in LOU #35, was identified by NDEP as requiring additional assessment and characterization of "unknown" waste materials disposed in this area. This area is also identified as SMU KMCC-025. Eight shallow soil borings (SB4-1 through SB4-8) were advanced and shallow samples (-S) were collected from depths of 0 to 12 inches bgs, and deep samples (-D) were collected from depths of 24 to 36 inches bgs. The sampling locations were chosen using a random generation sampling grid superimposed over the investigation area (Plate 6).

Based on information provided by a previous terminal manager, the truck unloading area was used for the unloading of inorganic materials. Sample analysis was conducted for total metals by EPA Method 6010/7000 and pH by SW-846 Method 9045. In addition, in order to assess whether degreasing or truck washing material remained at the site, the samples were analyzed for TPH and VOCs by EPA Methods 8015M-d and 8240, respectively. All samples collected were analyzed (Table 31).

Analytical results indicate that metal concentrations in the soil samples were not elevated compared to the range of the average background concentration of these constituents in Western U.S. soils.

The soil samples from the truck unloading area contained TPH at concentrations below the NDEP established criteria of 100 mg/kg for hydrocarbon-impacted soils. The pH for soils ranged from 8 to 10 (Table 31). With the exception of samples SB4-2-D, SB4-5-D, SB4-6-D, and SB4-8-S, the samples did not contain detectable VOC concentrations above the laboratory PQL. Samples SB4-2-D, SB4-5-D, SB4-6-D, and SB4-8-S contained acetone at concentrations of 11, 6.8, 7.0, and 8.7 μg/kg, respectively. However, acetone was also detected in a laboratory method blank at 4.4 μg/l. Samples SB4-6-D, SB4-5-D, and SB4-8-S were qualified as estimated values detected at a level less than the laboratory PQL. Analytical results of soil sample SB4-8-S indicated that the surface soil sample contained 2.4 μg/kg of TCA, which was also an estimated value detected at a level less than the laboratory PQL.

Based on the analytical results the truck unloading area has not been adversely impacted. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.20 LOU #36 Former Satellite Accumulation Points

This satellite accumulation point is located at the southwest corner of Unit 3. It includes a parts washer and the adjacent open area where lead acid storage batteries and waste from the parts washer were stored. From 1989 to 1991 a solvent-based washer was used and after 1991 a caustic detergent was used for washing. Waste stored in this area included drums of oil and grease, solvents (mainly 1,1,1-TCA), sludge, caustic detergent and metal parts. NDEP required no further action for LOU #36. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.21 LOU #37 Former Satellite Accumulation Points

This satellite accumulation point is located within the northeast portion of Unit 3. It includes a parts washer and the drum for temporary storage of parts washer waste. From 1989 to 1991 a solvent-based washer was used and after 1991 a caustic detergent was used for washing. Waste stored in this area included drums of oil and grease, solvents (mainly 1,1,1-TCA), sludge, caustic detergent and metal parts. NDEP required no further action for LOU #37. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.22 LOU #38 Former Satellite Accumulation Points

This satellite accumulation point is located outside the north wall of the laboratory. It was used to store hazardous chemicals used in the on-site laboratory. It consists of three metal chemical storage cabinets used to store partially full containers of flammable liquids. Once the containers were full they were placed in 55-gallon drums packed with vermiculite and shipped off site for appropriate disposal. NDEP required no further action for LOU #38. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.23 LOU #40 PCB Transformer Spill

The PCB transformer spill occurred at the south end of Unit 5. On November 26, 1990, approximately 1.75 pounds of PCB-containing fluid was released. The fluid dripped through access holes and collected on the concrete floor of the basement of Unit 5. The fluid was cleaned up with absorbents and portions of the concrete were also removed. The concrete was 8 inches thick. In August 1991, a small amount of soil was removed from beneath the concrete in preparation for replacing the concrete flooring. The soil removed was incidental to the concrete removal and this material was disposed off Site in Beatty, Nevada. NDEP required no further action for LOU #40. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.24 LOU #47 Leach Plant Area Manganese Ore Piles

Manganese ore has been stored and processed at the Site since 1951. Historically manganese ore piles were 10 to 15 feet high and over 300 feet long. The manganese ore was normally crushed with particles varying in size but typically 0.25 inch and smaller. Table 18 presents the analysis of the manganese dioxide ore. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.25 LOU #54 AP Plant Area Change House/Laboratory and Septic Tank

The AP plant change house laboratory is located in the west central portion of the Kerr-McGee facility (Plate 6 and 16). The change house was constructed in the early 1950s and the chemistry laboratory was added in 1980. Wastewater effluent from the change house showers, restrooms, and laboratory sinks discharged to a septic system with an associated leach field.

Laboratory operations included rinsing laboratory equipment, preparing standards, analyzing inorganic samples, preparing analytical solutions, and preparing dilute titrants. Hazardous solutions were collected and shipped to an appropriate disposal facility. Rinse water from the laboratory entered the septic system until August 1992. In August 1992, the use of the septic system was discontinued. The change house showers, restrooms, and laboratory sinks now discharge to a pump station, which transfers the water to the City of Henderson sanitary drains.

Two soil borings were advanced and three soil samples collected from each boring in the area of the former septic system leach field. The samples were analyzed for total metals, soil pH, VOCs, and SVOCs. The total metals and pH results are presented in Table 32. VOCs and SVOCs were below detection limits in the samples analyzed with the exception of sample SB6-1-5, which contained acetone at 9.8 μg/kg. This is an estimated value because it is below the laboratory PQL.

Analytical results of soil samples collected from the AP plant area change house/laboratory septic tank area indicate that total metal concentrations in the soil samples were not elevated above the range of the average concentration of these constituents in Western U.S. soils. The soils pH ranged between 8 and 10, which is in the normal range for arid soils. Based on the results of the sample analysis, the waste chemical disposal via the laboratory septic system has not affected soils in the area of the AP plant area change house/laboratory septic tank former leach field. Please refer to Table 32 for analytical results and Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.26 LOU #59 Storm Sewer System

The storm sewer system consists of a network of concrete, clay and tile storm drains, manholes and outfalls. Outfalls occur along Beta Ditch, tributaries to Beta Ditch, and other drainage ditches. Between 1941 and 1976 the storm sewer system conveyed storm water and process effluent. In January 1976 Kerr-McGee achieved "zero discharge" of industrial process wastewater. Kerr-McGee process solutions are controlled in vessels or in lined surface impoundments. The storm sewer is used to convey storm water and non-contact cooling water. The storm drain system is subsurface, ranging from 25 to 45 feet below grade. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.27 LOU #60 Acid Drain System

The acid drain system consists of a network of pipes, manholes and sumps used to collect acid effluent from throughout the BMI complex. The construction included the use of acid resistant materials. The system has a single outfall at the acid effluent neutralization plant. Kerr-McGee plugged the acid drain system beneath the operating portions of the facility in 1984. Acid drains in the non-operating portions of the facility (Units 1 and 2) have been filled with concrete debris and soil. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.28 LOU #62 State Industries Inc. Site, Including Impoundments and Catch Basin

State Industries leased portions of the Kerr-McGee property for the manufacture and storage of hot water heaters. State Industries operated two surface impoundments between 1974 and 1988. Both surface impoundments have been closed. Prior to closure, analysis of sludge samples indicated that the material was non-hazardous based on EP Toxicity tests. In 1995, seven borings and 24 samples were obtained to investigate soil under the proposed administration/office building. Samples were obtained to asses the engineering properties, sodium and sulfate soil contents, and soil pH (Table 33).

Fourteen soil borings were drilled in 1996 and 17 soil samples were obtained by State Industries, Inc. The samples were analyzed for total metals, corrosivity, and VOCs. Low levels of lead and molybdenum were present. VOCs were also detected in 7 of the 17 samples (Table 33). Split-samples were obtained by Kerr-McGee during the State Industries sampling event. VOCs analyses were conducted and seven samples were found to have detectable concentrations. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas. Appendix D contains a figure of the sample locations.

4.8.29 LOU #63 J.B. Kelley, Inc. Trucking Site

J.B. Kelley, Inc. leased property from Kerr-McGee immediately south and east of the truck unloading area and operated a trucking operation on site. The company hauled commodities such as lime and soda ash. The area of interest at the J.B. Kelley, Inc. are included a UST that stored diesel (excavated in 1991) and the site included open concrete vaults which formerly served as foundations for storage buildings. This area was formerly the site of Hardesty Chemical Company (Table 24 and Plates 6 and 16).

Concerning the open concrete vaults, because materials could potentially migrate through cracks in the concrete vault floor, in 1997 one shallow boring (SB7-1-1) was advanced through a crack in the floor and a soil sample was collected immediately beneath the concrete. Samples were also collected of sand that accumulated within each of the eight vaults. From these samples a composite "soil" sample was produced, S7-1-S. The samples were analyzed for total metals by EPA Method 6010/7000, soil pH by SW-846 Method 9045, TPH by EPA Method 8015M-diesel and VOCs by EPA Method 8240. The analytical results are presented on Table 24.

Toluene was detected at 1.1 μg/kg in sample S7-1-S. Sample SB7-1-1 contained 1.6 μg/kg of TCA and 13 μg/kg of acetone. These analyses were qualified by the laboratory. The concentrations of toluene and TCA were estimated since they were below the laboratory PQL. Acetone was detected in a method blank.

The results of total metal analyses indicate that all constituents were detected at concentrations within the range of average background concentrations in Western U.S. soils. Total chromium concentration in the surface soil sample collected by compositing remnant sands from the bottom of each vault was 42.9 mg/kg. While this concentration is slightly elevated, it is still below the range of average background concentrations indicating that chromium is not at concentrations likely to represent an environmental concern.

Both samples were non-detect for TPH at the designated laboratory PQL. Based on the analytical results of the soil samples collected, the former J.B. Kelley, Inc. operation has not affected surface and subsurface soil. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas. Appendix D contains a sketch of the sample locations.

4.8.30 LOU #67 Delbert Madsen and Estate of Delbert Madsen

The leased property was used as a storage and salvage yard. The property was leased from 1976 through 1995 (Kleinfelder, 1993). Kerr-McGee removed the material and trash that was left on-site and disposed of it at the Silver State Landfill in Apex, Nevada (Kerr-McGee, 1996b).

Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.31 LOU #68 Southern Nevada Auto Parts Site

The leased property was used to store wrecked, impounded and repossessed vehicles. Operations also included insurance adjustment and auction of vehicles. Stained soil was present in some areas. Kerr-McGee worked with the lessee to implement practices to minimize the potential for impacts to soil or groundwater to occur. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.32 LOU #69 Dillon Potter Site

Dillon Potter leased a 2-acre portion of the Kerr-McGee property. The area was used for livestock management and to store approximately 25 vehicles. The NDEP required no further action for LOU #69. Please refer to Plate 16 for the location of this area relative to other potential miscellaneous source areas.

4.8.33 GW-11 pond

Although not identified as an LOU, the GW-11 pond receives water for treatment. This pond is double-lined with leak detection wells between the liners. The GW-11 pond is located in the area of the former trade effluent ponds (LOU #1). During development of the NPDES permit, an extensive analysis of water discharged to pond GW-11 was completed. The data required to support the impoundment characterization was identified through an evaluation of the historical land use and a review of previous investigations. During the development of the Kerr-McGee Henderson facility NPDES permit for discharges from its groundwater remediation processes, Kerr-McGee worked closely with NDEP to identify and characterize the waste streams that would be placed in GW-11. An extensive sampling suite was jointly developed and applied to the GW-11 characterization. In response to requests from the NDEP Kerr-McGee collected and analyzed additional water samples from GW-11 in August and November 2004. Please refer to Table 34 for analytical data from Pond GW-11.

5.0 MIGRATION PATHWAY DESCRIPTION

Potential contaminant migration pathways within or off the Kerr-McGee Site exist through air, soil, surface water, groundwater, and biota. Each pathway is discussed below. Figures 5, 6, 7 and 8 illustrate the surrounding land use, potential source areas, contaminant pathways, and potential receptors.

5.1 Air Pathway

Contaminant transport can occur through the air pathway when contaminated soils are present at or near the surface and particulates are mobilized and carried by winds. This transport mechanism can also affect subsurface soils if they are excavated or grading exposes them to the effects of the wind. Due to the lack of surface covering over much of the Site and surrounding area, the lack of vegetation and the documented strong winds, air transportation can occur over many miles.

Contaminants capable of volatizing or releasing gases can move via air through soil as soil gas. These gasses can migrate into the atmosphere or can be transported deeper into the ground depending on molecular weight and temperature gradients. Due to the high summer temperatures, near-surface chemicals are susceptible to being volatized. Contaminants in surface water and groundwater can also volatize.

5.2 Soil Pathway

Near-surface contaminated soil may come into contact with human or ecological receptors. Pathways include direct contact through dermal adsorption, ingestion, or exposure to radiation if the soil is radioactively contaminated. Plants and animals often have greater exposure potential to subsurface soil, because their roots and burrows extend below the surface. If site excavations occur, plants, animals and people may be exposed to subsurface soil.

Migration can also occur in subsurface soils from excavation or grading, or mixing contaminated soil with previously non-impacted material. Residual contaminants in the soil can be leached through the pore space and into groundwater via surface water infiltration.

In addition, soil can be moved by surface water as sediment, causing it to be transported downgradient, as discussed below.

5.3 Surface Water and Sediment

Contaminated media can be transported on Site or off Site through surface water movement. Water can pick up impacted soil or sediment and move it in a downgradient direction,

especially when flowing across the Site due to rain or other run-off, or in bermed water control features such as in Beta Ditch. In addition, soluble contaminants can be dissolved and transported across the surface and/or infiltrate into the subsurface, contaminating the vadose zone and possibly continuing into the groundwater. Surface water can also concentrate and deposit dissolved salts when small pools form and the water evaporates.

Where contaminated groundwater surfaces as a seep, surface water is impacted in streams or washes such as the Las Vegas Wash. Surface water can also accumulate in surface water bodies such as Lake Mead. An interceptor system has been set up in the seep at Las Vegas Wash to collect and treat the impacted water. Containment and control of impacted water at the Seep is also supported by groundwater extraction wells in the area (Figure 8 and Plate 5).

5.4 Groundwater

Contaminants have contacted the groundwater and groundwater impacts have been documented from the Site to Las Vegas Wash (Plates 7 and 8). This pathway has been studied extensively, and several remediation systems have been set up to control, capture and treat the impacted groundwater.

Primarily groundwater movement occurs within the alluvial sediments, as well as within the Muddy Creek Formation. The groundwater tends to follow paleo channels of alluvial deposits, therefore, contaminants migrating with the groundwater travel within the alluvial channels. While higher concentrations of contaminants are primarily within the paleo channels, lower concentration contaminants are found along the edges of the paleo channels and elsewhere within the sediments. Subsequent to installation of the barrier wall, Athens Road, and Seep Interceptors there has been a measurable decrease in groundwater contaminants. In addition, an infiltration trench has been somewhat efficient in supplying water to maintain flow direction towards the Las Vegas Wash and flush channel sediments (Plates 2, 7, and 8 and Figure 8).

5.5 Biotic Pathway

When terrestrial and aquatic plants and animals come into contact with or ingest contaminated media, exposure, bioconcentration, bioaccumulation, and biomagnification can occur. The movement of contaminated biota can also transport contaminants.

6.0 ENVIRONMENTAL RECEPTOR IDENTIFICATION

The human and ecological receptors include on-Site workers, off-Site workers, off-Site residents, visitors, terrestrial plants and animals, and aquatic plants and animals (Figures 7 and 8). For an exposure pathway to be complete, the following conditions must be necessary and present: 1) a release mechanism; 2) a transport medium, and 3) a point of potential contact.

At present, approximately 90 full-time workers are employed at the Kerr-McGee Site. Surrounding land use is predominantly industrial. As shown on the land use and zoning map (Figure 5), there are also residential developments present nearby.

An inventory of biological resources was presented in the Final Environmental Impact Report for the Clark County Wetlands Park (1998). Appendix E lists the biologic resources identified. Ecological receptors including terrestrial and aquatic plants and animals have been identified as shown on Figures 7 and 8.

7.0 CONCEPTUAL SITE MODEL

The CSM of the Kerr-McGee Henderson facility is based upon data collected on the Site since 1986. The model will continue to be evaluated and refined as new data are developed. The CSM is a representation of the environmental system and the biological, physical and chemical processes that determine the transport of contaminants from the sources through the environmental media to human and ecological receptors.

Figures 6, 7 and 8 present generalized conceptual diagrams of the potential contaminant source areas, contaminant pathways, and potential receptors. These diagrams illustrate in a schematic manner the potential source areas, vadose zone, air, groundwater, and surface water pathways and potential receptors. Analysis of Site data indicate that chemicals used on Site have impacted primarily soil and groundwater. Potential source areas are identified and discussed in previous sections. For some source areas, there is not enough data to determine if they contain chemicals that may have the potential to impact human health and the environment. These areas will be addressed in the Work Plan discussed briefly in Section 8 of this CSM.

Vadose zone transport of Site-related chemicals is a function of having the necessary chemical environment and sufficient infiltration to mobilize the chemical through the unsaturated zone to the groundwater. Portions of the Site are paved or covered which prevents infiltration of water. Taking the arid climate and site physical condition into account, there are only a few specific occurrences that can generate sufficient water to mobilize the Site-related chemicals that are present in the subsurface vadose zone. These can include a rainstorm of sufficient quantity and duration to saturate the soil beyond its field capacity; a water supply pipeline break that discharges water to a specific area which then saturates to groundwater or developing a leak in, or beneath, a synthetically lined pond that releases sufficient water to reach the water table.

As discussed Flingin Section 3 lateral groundwater transport of Site-related chemicals is primarily within paleochannels incised within the Muddy Creek Formation. Plates 5 and 7 through 13 illustrate the potentiometric surface and the impacts identified in groundwater. Figures 2 and 3 show that the interceptor well field/groundwater barrier wall and Athens Road well field effectively capture groundwater in those areas. Groundwater flow continues northward towards the Las Vegas Wash where portions of the groundwater daylight (emerge as surface flow). Where the groundwater daylights, there are nine recovery wells, as well as a surface collection and recovery sump.

General exposure routes include inhalation, ingestion and dermal contact. Figure 7 presents the generalized potential source, primary release and transport mechanisms, secondary sources, secondary release and transport mechanisms, pathways, exposure routes, and

potential receptors. Receptors include on-Site workers, off-Ste workers, off-Ste residents, Site visitors, land plants and animals, and aquatic plants and animals.

Of the potential exposure pathways at the Site, the groundwater pathway is the predominant one for transporting constituents of concern from the Site. Other less significant pathways are air and surface water. If impacted groundwater emerges off Site in Las Vegas Wash, the surface water pathway grows in significance.

Due to the occasional high winds and the exposed on-Site soil, an air transport pathway is via entrainment of constituents of concern on dust particles. In addition, selected chemicals can volatize into air. The high summer temperatures, however, volatize near surface VOCs, if they are present.

Surface water transport of Site-related chemicals is minimized by the lack of on-Site surface water. Stormwater and water from leaking supply lines occasionally flows in the Beta Ditch and other ditches constructed for water control or conveyance. Historic transport of selected Site-related chemicals via surface water also occurred when impacted groundwater daylighted in a spring close to the Las Vegas Wash. Las Vegas Wash transports surface water to Lake Mead.

8.0 DATA GAPS

The Site has been studied extensively; over 950 wells and boreholes have been drilled in and around the BMI complex to characterize subsurface conditions. Groundwater and surface water impacts have been monitored and evaluated, and remedial actions have been implemented to mitigate chromium and perchlorate impacts.

The following data gaps have been identified:

1) **Background Determination**. Although regional information is available, background concentrations of metals and other naturally occurring compounds of concern in soil and groundwater have not been determined for the localized area. This issue is being jointly evaluated by Kerr-McGee and other BMI complex members by development of Background Study Work Plans.

2) **Muddy Creek Formation.** The configuration of the fine-grained facies of the Muddy Creek formation in specific areas of the site is not fully known and may affect the groundwater transport pathways and the effectiveness of the groundwater collection systems. This fact will be considered during development of the Work Plan described in item 4 of this Section.

3) **Chemicals of Potential Concern.** The potential exists for specific chemicals to pose a threat to human health or the environment, based on the list of Site-related chemicals developed. The nature and extent of impact and the risk posed by specific chemicals has not been fully evaluated, however, it is expected that the remedial actions addressing chromium and perchlorate impacts will also address other chemicals of concern. Development of the Chemicals of Potential Concern will be completed during the Work Plan development process described in item 4 of this Section.

4) **Source Area Evaluation**. The Phase I ECA, Phase II ECA and Supplemental Phase II ECA investigations identified sources of potential contamination at the Site. Additional investigation is needed to refine our understanding of the nature and extent of any impacts of source areas at the Site. A Source Area Evaluation Work Plan is under development to address these data gaps and will be submitted to NDEP as a separate document following discussion with NDEP.

5) **Data Usability**. The historic data need to be evaluated for their usability for human health and ecological risk assessment purposes. Data quality objectives need to be defined for historic, as well as future, data to ensure that remediation-related decisions

are properly supported. This data usability evaluation is underway and will be submitted to the NDEP as a separate document.

6) **Risk Assessment.** The risks posed by the Site to human and ecological receptors both on Site and off Site have not been determined. Following discussion with NDEP a Site Risk Assessment will be prepared, if needed.

9.0 REFERENCES

American Standard Testing Materials (ASTM), 1995. Cleanup Criteria for Contaminated Soil and Groundwater. January 1995.

Allen, H. E., M.E. Perdue and D. Brown, 1993. Metals in Groundwater. Lewis Publishers, Chelsea, Michigan.

ASTM, 2003. Standard Guide for Developing Conceptual Site Models for Contaminated Sites, designation 1689-95 (Re-Approved 2003) American Society for Testing and Materials.

Bell, J.W., 1981. Subsidence in Las Vegas Valley: Nevada Bureau of Mines and Geology, Bulletin 95, 84p.

Boul, S.W., F.D. Hole, R.J. McCracken, 1973. Soil Genesis and Classification. The Iowa State University Press, Ames, Iowa. 1973.

Clark County, 1998. Final Environmental Impact Report for Clark County Wetlands, Park.

Canonie Environmental, 1995. Phase II Environmental Site Assessment, Koch Material Company, Final Report, January 1995.

Covay, K.J., Banks, J.M., Bevans, H.E., and Watkins, S.A., 1996. Environmental and Hydrologic Settings of the Las Vegas Valley Area and the Carson and Truckee River Basins, Nevada and California: U.S. Geological; Survey Water-Resources Investigations Report 96-4087, 72p.

Donovan, D.J., 1996. Hydrostratigraphy and Allostratigraphy of the Cenozoic Alluvium in the Northwest Part of Las Vegas Valley, Clark County, Nevada: University of Nevada, Las Vegas, unpublished M.S. thesis, 196p.

Ecology & Environment, 1982. Summary and Interpretation of Environmental Quality Data, BMI Industrial Complex, Henderson Nevada, November 1982.

ENSR, 1997. Phase II Environmental Conditions Assessment located at Kerr-McGee Chemical Corporation, Henderson Nevada, August 7, 1997.

ENSR, 2001. Supplemental Phase II Environmental Conditions Assessment, April 2001.

ERM, 1996. Draft Phase II Investigative Report Associated with BMI Common Areas, August 30, 1996.

ETEC, 1995. Geotechnical Investigation Report, Administration/Office Building Between Lake Mead Drive and KMCC Plant Henderson, Nevada, November 20, 1995. ETEC Testing Laboratories, Inc.

Harrill, J.R., 1976. Pumping and Depletion of Ground-Water Storage in Las Vegas Valley, Nevada, 1955-74: Nevada Department of Conservation and Natural Resources Division of Water Resources, Water Resources Bulletin No. 44, 69p.

Kerr-McGee, 1994. Internal Correspondence, June 10, 1994.

Kerr-McGee, 1996a. Phase II Work Plan, May 1996.

Kerr-McGee, 1996b. Response to Letter of Understanding, Henderson Nevada, October 1996.

Kerr-McGee, 1997a. Phase II Work Plan, April 1997.

Kerr-McGee, 1997b-constantly updated. Mother-hen Database.

Kerr-McGee, 1998a. Perchlorate Characterization Project: Historical Review Report/ Sampling Plan, January 16, 1998.

Kerr-McGee, 1998b. Phase II Groundwater Perchlorate Investigation Report.

Kerr-McGee, 1998c. Preliminary Report on a Hydrologic Investigation of Channel-Fill Alluvium at the Pittman Lateral, Henderson, Nevada, October 19, 1998.

Kerr-McGee, 1998d. Response to Phase II Report Comments and Supplemental Phase II Work Plan, November 9, 1998.

Kerr-McGee, 2000. Work Plan for Seep Area Groundwater Characterization, March 2000.

Kerr-McGee, 2001. Seep Area Groundwater Characterization Report, Kerr-McGee Chemical LLC, Henderson Nevada, January 18, 2001.

Kerr-McGee, 2004a. Semi-Annual Performance Report, Chromium Mitigation Program, January to June 2004, July 26, 2004.

Kerr-McGee, 2004b. Quarterly Performance Report, Perchlorate Recovery System April to June 2004, July 28, 2004.

Kleinfelder, 1993. Environmental Conditions Assessment, Kerr-McGee Chemical Corporation, Henderson, Nevada Facility, April 15, 1993 (Final).

Langenheim, V.E., Grow, J., Miller, J., Davidson, J.D., and Robinson, E. 1998. Thickness of Cenozoic Deposits and Location and Geometry of the Las Vegas Valley Shear Zone, Nevada, Based on Gravity, Seismic-Reflection and Aeromagnetic Data: U.S. Geological Survey Open-File Report 98-576, 32p.

Las Vegas Valley Groundwater Management Program, 2004. website www//lasvegasgmp.com

Maxey, G. B., and Jameson, C.H., 1948. Geology and Water Resources of Las Vegas, Pahrump, and Indian Springs Valleys, Clark and Nye Counties, Nevada: Nevada State Engineering, Water Resources Bulletin 5, 121p.

NDEP, 1986. Consent Order between Kerr-McGee and NDEP, September 9, 1986.

NDEP, 1991. Consent Agreement. Phase I Environmental Conditions Assessment, April 25, 1991

NDEP, 1994. Phase II Letter of Understanding between NDEP and Kerr-McGee, August 15, 1994.

NDEP, 1998a. Review of Phase II Environmental Conditions Assessment, June 10, 1998.

NDEP, 1998b. Approval of Phase II Response to Comments & Supplemental Work Plan, December 17, 1998.

NDEP, 1999. Consent Agreement between Kerr-McGee and NDEP, July 26, 1999.

NDEP, 2001. Administration Order on Consent between Kerr-McGee and NDEP, October 8, 2001.

NDEP, 2004. Response to Supplemental Phase II Report-Environmental Conditions Assessment, February 11, 2004.

Plume, R.W., 1989. Ground-Water Conditions in Las Vegas Valley, Clark County, Nevada: Part 1. Hydrologic Framework: U.S. Geological Survey Water-Supply Paper 2320-A, 14p.

Southern Nevada Water Authority, 2004. website www//snwa.com

Tetra Tech EM, 2004. Titanium Metals Corporation Preliminary Conceptual Site Model Accelerated Work, Titanium Metals Corporation Facility, Henderson Nevada DRAFT. June 28, 2004 Tetra Tech EM Inc.

US BLM and Clark County Department of Parks and Recreation, 1998. Final Environmental Impact Report, Clark County Wetlands Park, December 1998.

US EPA, 1996. Soil Screening Guidance Users Guide, Attachment A Conceptual Site Model Summary.

US EPA, 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, EPA/540/G-89/004 October 1988.

US EPA, 1989. Risk Assessment Guidance for Superfund for Superfund Volume 1, Human Health Evaluation Manual (Part A) Interim Final December 1989.

Van Denburgh, A.S., Seitz, H. R., Durbin, T.J., and Harrill, J. R., 1982. Proposed Monitoring Network for Groundwater Quality, Las Vegas Valley, Nevada: U.S. Geological Survey Open-File Report 80-1286, 25p.

Western Technologies, 1996a. Subsurface Soil Evaluation Former Evaporative Ponds Sites, Former State Industries Facility, BMI Industrial Complex, Henderson, Nevada, On behalf of State Industries, Inc., February 20, 1996.

Western Technology, 1996b. Subsurface Soil Exploration, Former Koch Materials Facility, BMI Industrial Complex, Henderson, Nevada, April 1996.

Western Technologies, 1996c. Subsurface Soil Evaluation, Warm Springs Road Extension, Phase I, U.S. Highway 95 to Eastgate Road, Henderson, Nevada, Prepared for the City of Henderson, June 24, 1996.

Western Technologies, 1996d. Phase II Subsurface Soil Evaluation, Warm Springs Road Extension, Eastgate Road to Boulder Highway, Henderson, Nevada, Prepared for the City of Henderson, June 24, 1996.

Zikmund, K.S., 1996. Extent and Potential Use of the Shallow Aquifer and Wash Flow in Las Vegas Valley, Nevada: Southern Nevada Water Authority, 20p.

Removal Action Work Plan
for Phase B Soil Remediation of Remediation Zones RZ-B through RZ-E
Tronox LLC
Henderson, Nevada

Revised June 22, 2010

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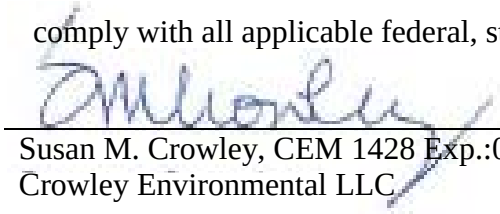
Removal Action Work Plan
For Phase B Soil Remediation of Remediation Zones RZ-B through RZ-E
Tronox LLC
Henderson, Nevada

Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.



Susan M. Crowley, CEM 1428 Exp.:03/08/11
Crowley Environmental LLC

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APPENDICES

1.0 INTRODUCTION

Northgate Environmental Management, Inc. (Northgate) has prepared this Removal Action Work Plan (RAW) for the Tronox LLC (Tronox) facility located in Henderson, Nevada (the Site). This RAW presents the methods and procedures to be used to implement the remedial alternative approved by the Nevada Division of Environmental Protection (NDEP) to address contaminated soil within 10 feet (ft) below grade surface (bgs) at the Site.

The objective of this RAW is to present a cleanup strategy that complies with the NDEP Order December 14, 2009 to remove all impacted soil from the Site by the end of 2010, which will reduce the human health risks associated with contaminated soil in four areas defined as Remediation Zones (RZs) -B through -E (Figure 1). For purposes of the RAW and designation of potential remediation areas, "contaminated" soil is generally defined as concentrations exceeding NDEP worker BCLs, or modified risk-based goals as agreed upon by NDEP. For metals where background concentrations exceed BCLs (e.g., arsenic), "contaminated" soil is defined as concentrations that result in a determination that, for the whole of the RZ, concentrations are greater than background. There are no NDEP BCLs for asbestos; therefore, "contaminated" soil is defined as one or more long fibers (amphibole) and/or five or more long fibers (chrysotile).

Soil sampling in RZ-A did not identify soils exceeding NDEP clean-up criteria and is therefore not included in this RAW. A human health risk assessment will be conducted for RZ-A in accordance with the Health Risk Assessment Work Plan (HRA WP; Northgate, 2010a) similar to that planned for RZ-B through RZ-E once soil remediation is completed. The scope of work presented in this RAW is based on the results of the Phase A and B Source Area Investigations (ENSR, 2006 and ENSR, 2008) and discussions with NDEP, during which the scope and approach to remediation were determined on February 5th, 12th, and 22nd of 2010. Additional investigation/confirmation testing work has been approved by NDEP (Northgate, 2010b). This new investigation data will be incorporated into RZ-specific addenda to the RAW. This RAW is intended to be consistent with NDEPs decisions regarding remediation goals and Northgate's human health risk evaluations presented to NDEP during meetings and discussions. Soil remediation work will be performed in accordance with this RAW, including the Standard Operating Procedures (SOPs) established by Basic Remediation Company (BRC, 2009a-j) for the Black Mountain Industrial (BMI) complex and the Quality Assurance Project Plan (QAPP; AECOM and Northgate, 2009) . Additionally, Northgate has prepared the following plans to be implemented as Appendices to this RAW:

- Dust Mitigation Plan and Clark County Dust Permit Application (Appendix A);
- Perimeter Air Monitoring Plan (Appendix B);
- Stormwater Pollution Prevention Plan (Appendix C);
- Example Contractor Health and Safety Plan, Table of Contents (Appendix D);
- Transportation Plan (Appendix E);
- Remediation Schedule (Appendix F); and
- Historic Manganese Tailing Pile Cross-Sections (Appendix G).

1.1 Site Description and History

The Site is located approximately 13 miles southeast of the city of Las Vegas in an unincorporated area of Clark County, Nevada, and lies in Sections 1, 12 and 13 of Township 22 S, Range 62 E, (see Figure 2). The approximately 450-acre Site is located within the BMI complex, owned and operated by multiple chemical companies, one of which is Tronox.

The BMI complex was first developed by the U.S. government in 1942 as a magnesium plant for World War II operations. Later, a part of the BMI complex was leased by Western Electrochemical Company (WECCO) that would ultimately become the Tronox Site. WECCO produced manganese dioxide, sodium chlorate, sodium, and other perchlorates. WECCO also produced ammonium perchlorate (a powerful oxidizer) for the Navy during the early 1950s using a plant that was constructed on property owned by the Navy. WECCO merged with American Potash and Chemical Company (AP&CC) in 1956, with continued production of ammonium perchlorate for the Navy. In 1967, AP&CC merged with Kerr-McGee Corporation (Kerr-McGee) and began production of boron chemicals in the early 1970s. The production processes included elemental boron, boron trichloride (a colorless gas used as a reagent in organic synthesis), and boron tribromide (a colorless fuming liquid compound used in a variety of applications). The production of boron tribromide was discontinued in 1994, and the production of sodium chlorate and ammonium perchlorate were discontinued in 1997 and 1998, respectively. Perchlorate was reclaimed at the Site using existing equipment until early 2002.

In 2005, Kerr-McGee Chemical LLC became Tronox LLC. Tronox's Henderson facility continues to produce electrolytic manganese dioxide, used in the manufacture of alkaline batteries; elemental boron, a component of automotive airbag igniters; and boron trichloride,

used in the pharmaceutical and semiconductor industries and in the manufacture of high-strength boron fibers for products including sporting equipment and aircraft parts.

During the 1970s, the U.S. Environmental Protection Agency (U.S. EPA), the State of Nevada, and Clark County investigated potential environmental impacts from the BMI companies' operations including atmospheric emissions, groundwater and surface water discharges, and soil impacts (Ecology and Environment, 1982). From 1971 to 1976, Tronox (then Kerr-McGee) modified its manufacturing process and constructed lined surface impoundments to recycle and evaporate industrial wastewater. In 1976, the facility achieved zero discharge status regarding industrial wastewater management. In 1980, the U.S. EPA requested specific information from the BMI companies regarding their manufacturing and waste management practices by issuing Section 308 letters. In 1994, NDEP issued a Letter of Understanding (LOU) to Kerr-McGee that identified 69 specific areas or items of interest and indicated the level of environmental investigation they wanted Kerr-McGee to conduct.

Tronox has continued to undertake environmental investigations to assess environmental conditions at the Henderson facility. A detailed discussion of the specific areas or items of interest identified in the LOU and a list the products made, years of production, and approximate waste volumes for WECCO, AP&CC, and Tronox are found in the Conceptual Site Model document (ENSR, 2005).

During meetings held on February 5th, 12th, and 22nd of 2010, the scope and approach of work for soil remediation at the Site was presented to NDEP. On behalf of Tronox, Northgate presented maps showing proposed boundaries of potential remediation areas where chemical constituents are present in the upper 10 feet of the subsurface at concentrations above Basic Comparison Levels (BCLs) and other Site-specific comparison criteria[1], based on the results of sampling during the Phase A and B Source Area Investigation programs. Tronox also presented proposed pre-confirmation sampling locations to further refine the vertical and horizontal extent of the proposed remediation areas.

At the conclusion of the February 22, 2010 meeting, NDEP and Tronox discussed the conceptual scope and implementation of the soil remediation program needed to comply with the December

[1] *Criteria 1 (dark blue polygons on Figure 3):* Arsenic greater than 18 milligrams per kilogram (mg/kg), chrysotile long fiber count greater than 13, amphibole long fiber count greater than 1, dioxin greater than 2,200 parts per trillion (ppt), all other constituents greater than NDEP worker basic comparison levels (BCLs).
Criteria 2 (light blue polygons on Figure 3): Arsenic greater than 7.2 and less than 18 mg/kg, chrysotile long fiber count greater than 5 and less than or equal to 13, dioxin greater than 1,000 and less than or equal to 2,200 ppt, and low levels of polycyclic aromatic hydrocarbons (PAH)s.
Criteria 3 (teal polygons): one long amphibole fiber with no other risk drivers.

2009 Order. Section 2.0 of this RAW, and the support plans included as appendices to this RAW, present the detailed scope of work, consistent with previous discussions with NDEP.

1.2 Background

Chemical analyses of soil samples collected during the Phase A and B sampling programs showed that within the upper 10 feet of soil, there are locations where dioxin, hexachlorobenzene (HCB), and other semi-volatile organic compounds (SVOCs); polychlorinated biphenyls (PCBs), asbestos, metals, organochlorine pesticides (OCPs); and/or perchlorate exceed the various BCL related criteria.

Voronoi/Thiessen remediation polygons were generated for the Site using the Phase A and B soil analytical data. The remediation polygons define areas with BCL exceedances or other criteria (as specified on Figure 3 and defined in footnote[1]). There are a few locations where total petroleum hydrocarbons (TPH) exceed 100 milligrams per kilogram (mg/kg) but individual concentration of TPH constituents such as benzene, toluene, ethyl benzene, xylenes (BTEX)[2] or the individual PAHs do not exceed worker BCLs. As approved by NDEP, "TPH only" RZs are not included as potential excavation locations. In total, 107 remediation polygons have been retained for further characterization, refinement, and remediation.

During the meeting on February 22, 2010, NDEP suggested that the Site would be divided into five RZs that are based on geographic groupings of detections of chemicals and conceptual site model (CSM) considerations. Figure 1 shows the five RZs (named RZ-A through RZ-E).

In the Work Plan dated March 9, 2010 (Northgate, 2010b) and conditionally approved by NDEP on March 23, 2010 (REF), Northgate described the approach for "pre-confirmation sampling" within the four RZs where soil remediation is required. The pre-confirmation sampling work plan includes:

- Data tables for samples collected during Phase A and B investigations for each of the 107 remediation polygons that have been used to depict areas targeted for remediation in this and previous documents;
- A description of the proposed pre-confirmation sampling program; and
- The sampling rationale.

[2] There were no samples within the upper 10 feet of soil where BTEX compounds were reported above worker BCLs.

The pre-confirmation samples will be used to refine the horizontal and vertical extent of impacted soil and to prepare excavation plans and "cut-lines" needed to meet NDEP cleanup requirements. Northgate anticipates that after establishment of excavation cut-lines, the RZs shown on Figure 1 will meet NDEP criteria for statistically "homogeneous" areas for conducting HRAs. If adjustments are needed, final RZs will be consistent with the CSM and the results of the pre-confirmation soil sampling, and statistical requirements. The final excavation plan for each RZ will contain figures that have updated cut-lines based on CSM review and pre-confirmation data. Remediation cut-lines will be reviewed with NDEP prior to preparation of the final excavation plan. The reader is referred to the Northgate 2010 document for additional details regarding pre-confirmation sampling.

1.3 Site Conditions

The Site is generally rectangular in shape with the long side in the north-south direction. Elevations across the Site range from 1,677 to 1,873 feet above mean sea level. The land surface slopes toward the north at a gradient of approximately 0.023 feet per foot (ft/ft). The developed portions of the Site have been modified by grading to accommodate plant facility buildings, surface impoundments, access roads, a landfill, and other Site features.

The major buildings that exist on the Site include Unit Buildings 1 through 6. These were the main buildings during World War II magnesium production. Unit Building 3 is currently used by Tronox for offices and storage. Unit Buildings 5 and 6 are currently used by Tronox for production of manganese dioxide, with Unit 5 also used for storage. Unit Buildings 1, 2, and 4 are not currently used and have been partially demolished. Other buildings exist on the Site including an administrative office building, a wash room building, Tronox production facilities, water treatment facilities operated by Veolia Water North America, a laboratory building, former perchlorate production facilities, and other buildings. Included within the Site is a 600- by 750-foot area owned and operated by the lime producer Chemstar. Three ponds exist at the northern end of the Site that will remain in use during the remediation and will be retained by Tronox (see Figure 4).

Manganese tailings have been stockpiled and capped with soil over approximately 8.6 acres in the eastern central portion of the Site. The historic tailings pile will be removed from the Site between approximately May to July of 2010, as further described in Section 4 of this RAW.

The Site is crossed by asphalt and concrete roads, dirt roads, and railroad spurs. One of the rail spurs is still in service. An extensive network of active and inactive underground utility lines is

present under the roads and open areas at the Site. A drainage ditch (Beta Ditch) crosses the Site from west to east. During the main production era, the Beta Ditch was the main drainage for liquid wastes that flowed to the pond areas to the east. Currently the Beta Ditch is blocked by an earthen dam near the eastern end. According to Timet, drainage from the Beta Ditch from the Tronox Site will no longer be allowed.

Within the boundaries of the Site are the Sale Parcels A, B, C, D, E, F, G, H, and I. These parcels are at the edges of the Site at the north, west, and south sides (see Figure 4). The Sale Parcels are not currently in use. This RAW does not include any removal actions on the Sale Parcels. Excavation of impacted soil on the Sale Parcels has been addressed in accordance with a work plan submitted to and approved by NDEP (Basic Environmental Company, 2008). Excavation and removal of soil from the Sale parcels began in March 2010 and will be completed in April 2010.

2.0 SCOPE OF WORK

Soil excavation is planned for RZs -B, -C, -D, and -E, depicted on Figure 3. These areas may be modified based on CSM review and analytical results from the pre-confirmation sampling. Areas where remediation will not occur due to Tronox operations include the ponds in RZ-D and the Leach Plant. These areas will require institutional or engineering controls (see Section 6.0). Information resulting from the pre-confirmation sampling will be incorporated into addenda to the RAW's specific section for each RZ. If revisions are needed, RZ addenda to this RAW will be prepared and will present revised RZ figures.

Based on NDEP guidance during recent meetings, Northgate will excavate to depths of 6 inches below existing grades in areas impacted by asbestos above risk-based goals unless deeper excavation is indicated by pre-confirmation sampling. Contaminated RZs will be excavated to pre-determined depths based on existing and pre-confirmation soil sampling data. The nature of contamination in each polygon is shown on Figure 3. Excavated soil will be transported for permanent off-Site disposal at the Apex Landfill in Las Vegas or other approved landfills, in accordance with sampling results and landfill acceptance criteria.

All work conducted as part of this RAW will be in accordance with the following plans:

- Dust Mitigation Plan and Clark County Dust Permit (Appendix A);
- Perimeter Air Monitoring plan (Appendix B);
- Stormwater Pollution Prevention Plan (Appendix C);
- Site Health and Safety Plan (Example Table of Contents in Appendix D); and
- Transportation Plan (Appendix E).

2.1 Site Preparation

This section describes the Site preparation activities that will be performed prior to excavating and transporting soil from the Site. These include excavation area clearing and grubbing, well abandonment, documentation of pre-excavation Site conditions, permitting, and establishment of Site controls.

Demolition, if any, will take place prior to soil remediation and will be under a separate contract. However, to facilitate scheduling of the remediation, excavation can commence in portions of the RZ other than the potential demolition areas. Demolition will not be used as a basis for delaying excavation in an entire RZ.

Features and concrete slabs will be demolished. Concrete, brick, CMU blocks, wood, sheetrock, and other demolition debris will be transported to an approved off-Site landfill for disposal. Concrete and other non-vegetative debris in contact with contaminated soil is assumed to be impacted and will not be recycled. Any buildings to be demolished will be surveyed in advance for the presence of asbestos, lead-based paint, fluorescent tubes, ballasts containing PCBs, refrigerants, mercury-containing devices such as thermostats, and other hazardous materials. Materials found in the survey will be removed in accordance with applicable federal, state, and local regulations

If needed, demolition will take place in the RZs before soil remediation has commenced in that zone.

2.1.1 Work Area Preparation

Prior to performing soil excavation activities, the following remediation support features will be established/constructed. These features are delineated in Figure 5:

- Access routes for authorized visitor and contractor Site ingress and egress;
- Haul roads to the public access roads;
- Dust-control water source(s);
- Visitor area;
- Management/engineering trailers;
- Parking areas for workers, vehicles, and heavy equipment;
- Debris storage area; and
- Vehicular and personnel decontamination areas.

If present, vegetation will be removed from excavation areas and access routes. Soil attached to plant roots will be shaken loose and left on the ground surface in the area in which the vegetation was present, to be collected with the other soils from the area. The vegetation will be relocated and temporarily stockpiled within the debris storage area (Figure 5), where it will be tested to determine whether chemicals within Site soils have bio-accumulated within plant material at levels that would cause it to be unsuitable for disposal at a municipal landfill. In the event that vegetation, after testing, meets disposal requirements in municipal landfills, they will be so disposed. In the event that contaminant levels in vegetation dictate that they be disposed in hazardous waste landfills, they will be so disposed. The testing will be consistent with requirements from potential disposal sites. Debris present in excavation areas will be removed

from those areas and relocated in the debris storage area (Figure 5). This area is a rectangular plot approximately 60 by 150 feet. Debris will be removed from this area promptly and long term accumulation is not expected. If debris shows evidence of containing potentially hazardous materials, it will be stockpiled separately within the debris storage area. Small dirt berms will be created in order to provide containment of any contamination and in order to avoid storm water run-on onto and run-off from this area. Underground pipes, electrical conduits, water and sewer lines in the remediation areas will be identified, located, and de-energized, locked out, or blinded off prior to commencement of excavation, as appropriate.

2.2 Well Abandonment

A number of monitoring wells have been installed in the proposed remediation areas as part of historical field investigations. Locations of existing monitoring wells are depicted in Figure 6. The earth-moving activities planned as part of remediation may destroy the surface expression of these wells; therefore, Northgate will evaluate whether protection of the existing monitoring wells in planned excavation areas and access routes is feasible and where protection is not feasible. The results of this evaluation including a list of wells specified for abandonment and replacement (as necessary) will be provided to NDEP in the Excavation Plans for each remediation zone.

Prior to initiation of soil excavation activities and building of access roads, Northgate will abandon wells or work around them, as appropriate. Northgate and Tronox acknowledge that similar wells may need to be reinstalled after the remediation work is completed, in order to continue groundwater characterization and remediation activities, as needed. Wells located outside excavation areas and access routes will be retained, clearly marked, and Northgate will instruct the remediation contractor to employ measures to protect these wells from damage during remediation. Well abandonment procedures will be performed in accordance with Nevada Division of Water Resources (NDWR) requirements.

2.3 Establish Pre-Excavation Conditions

The Site will be surveyed, visually inspected, and photographed. The entire Site has been topographically mapped, using 1-foot elevation contours. These contours are depicted as elevations above the standard North American Vertical Datum (NAVD; NAVD, 1988; shown in Figure 7). The NAVD is a benchmark used to precisely measure the surface topography, and subsurface lithography and hydrology data in the future, irrespective of changes to the surface topography.

All areas to be excavated as well as ditches and other areas requiring remediation will be staked in the field and posted with weatherproof signage prior to commencement of excavation.

2.4 Permitting

Prior to commencing soil excavation activities, required permits will be obtained from the associated oversight agency. The following permits are anticipated for this project:

- Northgate will submit to NDWR a completed Affidavit of Intent to Abandon Monitoring Well for each such well prior to abandonment;
- A permit to remediate asbestos-containing materials will be obtained from the Clark County Environmental Health Department;
- A Dust Control Permit will be obtained from the Clark County Department of Air Quality and Environmental Management (DAQEM). It includes a Dust Control Mitigation Plan; and
- A permit will be obtained from Nevada Department of Transportation (NDOT), if required, to transport soil on State roads. Northgate will also seek City of Henderson concurrence on the plan for transportation of impacted material.

2.5 Site Controls

Current access to the Site is controlled by a perimeter fence with locking gates and security personnel. Northgate expects that it will be necessary to provide additional access point(s) during the course of remedial activities. Therefore, as part of the remedial activities, additional gate(s) and security personnel will be provided, as necessary, to prevent unauthorized entry to the Site.

Additional Site controls will be employed to control traffic flow, including pedestrian traffic, within the Site during remediation. These Site controls are necessary to direct the following:

- Remediation workers;
- Vendors and subcontractors (e.g., equipment mechanics, materials delivery, trucking subcontractors, laboratory couriers); and
- Site visitors (e.g., agency staff, elected or appointed government officials, journalists).

Visitors must be escorted by Tronox or Tronox trained security personnel. No visitors will be allowed on the Site without escorts, with the exception of NDEP representatives who have completed the Tronox safety training program and will be on-Site to observe the remedial work. Properly trained NDEP personnel will be required to check in to the administrative office and receive a badge and vehicle pass on a daily basis. Signs posted on the fencing will warn visitors

against unauthorized entry onto the Site. All personnel will be required to attend a tailgate health and safety briefing before entering the exclusion zone. Security personnel will be present 24 hours a day, 6 days a week, for the duration of the remediation project.

3.0 REMEDIATION

This section describes the remediation activities, including excavation procedures, the methods for transporting soils to the landfill, air monitoring procedures, decontamination procedures, and documentation. As previously discussed, the Transportation Plan (included as Appendix E) describes the transportation routes to be followed and procedures for managing the off-Site disposal of materials.

3.1 Soil Excavation

Northgate and Tronox plan to remediate the Site from south to north in the order of the four RZs (-B, -C, -D, and -E; see Figure 1). RZ-A does not have exceedances over the BCLs for on-Site workers. A human health risk assessment will be performed for RZ-A, but no excavation or removal action is proposed for this area. Soil remediation will occur in RZs B through E.

3.1.1 Excavation Procedures

A contractor will be retained to complete the excavations in accordance with the plans and specifications developed for this work, under the direction of the Northgate Project Manager. Prior to initiation of excavation, the areas to be remediated will be marked in the field by a licensed land surveyor.

The contractor will utilize construction equipment (e.g., scrapers, dozers, excavators, etc.) as appropriate to remove the soil containing elevated concentrations of chemicals and asbestos to the depths and lateral extent specified. The soil may be loaded directly into trucks for off-Site disposal or may be temporarily stockpiled within the remedial area before being loaded and off-hauled. During the transport phase, these stockpiled soils will be loaded onto dedicated trucks for direct disposal at Apex landfill (non-hazardous waste) or US Ecology landfill (hazardous waste). Non-hazardous contaminated soil and asbestos containing soils will be disposed of at the Apex landfill. Air monitoring procedures as described in the PAMP, differ for remediation areas impacted with chemicals and those impacted with asbestos.

Northgate anticipates that approximately 440,000 cubic yards of soil will be excavated and removed from the Site with the exception of the manganese tailings located in RZ-C. The actual volume will depend on the results of confirmation and pre-confirmation sampling. For volume estimating purposes, Northgate has assumed that a minimum of 6 inches of soil will be excavated from the locations determined to require remediation due to the presence of asbestos Areas impacted with asbestos and chemicals will be excavated to levels below approved cleanup levels.

The planned depths will be confirmed, as necessary, prior to excavation by the pre-confirmation sampling program. Excavation within each area to be remediated will be performed until the specified excavation depths are attained.

In order to minimize the potential for cross-contamination during hauling of soil within the Site, Northgate and Tronox proposes the following actions that will be taken as appropriate depending on the on-Site transportation route; need for access by Tronox, Veolia, and inspection personnel; and the location of the remediation area with respect to haul routes:

A. Allow the haul trucks to utilize a designated haul route within the Site that can be isolated from on-Site traffic through use of barricades, fences, traffic control personnel. Haul routes will be cleaned of impacted residue before turning over to normal traffic use; and

B. Utilize a portable truck wheel wash in landlocked areas, where Alternate A above cannot be applied, at the edge of the remediation area to perform decontamination prior to entering internal roads used by normal Tronox, Veolia, and inspection personnel traffic.

Following completion of remediation of the Site, decontamination areas will be remediated by removing all decontamination equipment, collecting and analyzing surface soil sample from the perimeter and bottom of the wheel wash stations, track-out stations, personnel decontamination areas, and excavating and disposing of soil, as appropriate.

In order to maintain slope stability of the pond embankments for Ponds GW-11, WC-West and WC-East, the Contractor will not approach closer than 50 feet horizontally from the toe of the berms with the planned remedial excavation. These areas will later be addressed through institutional and engineering controls as discussed further in Section 6.0.

Excavation areas terminated in the event of an unexpected condition (e.g., significant subsurface obstruction or facilities that prevent soil removal) will be identified in the field notes and described in the interim status and removal action completion reports (Sections 4.1 and 4.2). If such areas are encountered, alternative remedial approaches will be considered and discussed with NDEP. When excavation in a given area ceases, it will be graded to reduce physical safety hazards such as steep slopes. Excavations will be sloped in accordance with the Occupational Safety and Health Administration (OSHA) guidelines presented in 29 CFR 1926, Subpart P – Excavations. Specifically, sloping guidelines are presented in Appendix B of 1926 Subpart P, with supporting soil classification guidelines in Appendix A of the same subpart. Excavations

will be inspected by a licensed professional civil engineer, whose task it shall be to verify that excavations are being carried out in conformance with the grading plan. Furthermore, as noted in Section 3.1.4, a licensed surveyor will conduct a post-excavation topographic survey. In addition to the sloping requirement, temporary fencing will be placed along the perimeter of excavations deeper than 5 feet. Portions of the excavation sidewalls may also be flattened or the excavation partially backfilled to facilitate vehicle traffic or soil handling activities.

Excavation and hauling equipment will be fueled directly from a fuel truck brought onto the Site for that purpose; equipment fueling will be conducted only within a designated and lined fueling area. The designated fueling area is shown on Figure 5. Following completion of project fueling needs, surface soil samples will be collected and analyzed from the designated fueling and the areas will be remediated, as appropriate.

3.1.2 Health and Safety

Remediation activities will be performed in accordance with the Health and Safety Plan (HSP: Appendix D) developed for Site remediation activities by the contractor selected for this project. This HSP shall apply to the contractor's employees and subcontractors. The parameters of this HSP shall contain the items noted in the Example Table of Contents shown in Appendix D. Briefly, the HSP shall include the following:

- Identification of chemical and physical hazards associated with the remediation activities;
- Minimum training requirements for Site workers;
- Minimum Personal Protective Equipment (PPE) for Site workers and visitors and criteria for upgrades;
- Air monitoring requirements for workers' breathing zone and the Site perimeter (for public protection);
- A Site Hazard Analysis including chemical, non-chemical and biological hazards;
- Decontamination procedures;
- Emergency information, such as emergency telephone numbers and directions to the nearest hospital; and
- Administrative requirements, such as documentation of training, daily health and safety tailgate meetings, and documentation of air monitoring.

3.1.3 Dust Control

Specific dust control procedures and requirements are presented in the Dust Mitigation Plan provided in Appendix B. These procedures consist of wetting surface soil in the immediate excavation areas and along transport routes prior to and during excavation and transportation activities. Water is available for use from hydrants located throughout the Site except hydrants within the active plant areas. The remediation contractor may elect to install a raised storage tank to rapidly fill water trucks. The proposed location for a raised storage tank is near an existing hydrant east of the maintenance Building (See Figure 5).

During excavation activities, air monitoring will be conducted in accordance with the Perimeter Air Monitoring Plan (Appendix B) and HSP to verify that Site workers are protected and off-Site dust transport is controlled.

3.1.4 Post-Excavation Grade Survey

After excavation is deemed complete, Northgate will direct a licensed surveyor to conduct a post-excavation topographic survey. Northgate will use the information from this survey to confirm that excavation cut-lines have been achieved and to prepare a detailed topographic map representing post-remediation conditions; this map will use a 0.5-foot elevation interval. In addition, the post-excavation map will be prepared using colored contours that depict the depths.

3.1.5 Post-Excavation Backfilling

Tronox may elect to backfill some of the excavations with imported backfill material. Such backfilling will be performed by the Contractor in accordance with the remediation plans and specifications. Backfill materials will be tested by Northgate for geotechnical and environmental requirements, and testing results will be provided to NDEP for approval, before being accepted for on-Site use.

3.2 Soil Transportation to Approved Landfill

After soils are excavated, they will be loaded onto dedicated trucks for direct transportation to Apex Landfill or another approved landfill. Measures will be taken to minimize the potential for impact to other areas of the Site as described in Section 3.1.1. Air monitoring during these loading activities will be performed as discussed in Section 3.3 to evaluate the effectiveness of dust suppression measures. As described below, soils excavated from the Site that are non-hazardous will be transported in covered trucks to Apex Landfill, approximately 37 miles away

from the Site. Excavated soils that are hazardous waste will be transported to U.S. Ecology landfill, located approximately 119 miles from the Site. The Transportation Plan (Appendix E) includes haul route descriptions and route maps for both disposal facilities. All operators and vehicles will be properly licensed by the Nevada Department of Transportation. If the waste is profiled as hazardous, operators will possess a valid hazardous waste hauler license and will be certified to handle hazardous waste.

Access and haul routes will be clearly marked in the field with weatherproof signage. It is anticipated that the haul routes will not cross or enter Boulder Highway; rather, the haul route from the Site will utilize 4th Street to reach West Lake Mead Drive. Trucks will turn right at a signaled intersection and drive approximately ¼-mile to reach Highway 93/95 to the west. Before leaving the Site, trucks will travel through gravel track-out aprons to minimize any carry-on transport of materials onto 4th Street. These track-out aprons will be routinely refreshed to maintain efficacy. Because the access routes will be "wetted" to suppress dust, some mud may be generated, and it is likely that this mud would be transferred to truck tires and the vehicle body. When needed, prior to leaving the Site, the transport trucks will be decontaminated by scraping, sweeping, and/or a water spray to avoid transfer of dirt to the road pavement. In addition, each truck will be inspected prior to leaving the Site to verify that any loose soil or mud has been removed from tires and the truck body. Spillage of soils from trucks during transport will be minimized by not overloading the transport vehicles, by grading smooth haul roads, and by employing trucks with enclosed or covered cargo bays. Dust will be controlled by the application of water in accordance with the Dust Mitigation Plan (Appendix A). At a minimum, after excavation/transport operations cease for a given day, any affected portion of 4th Street will be cleaned using a street sweeper to remove any soils from the roadway. Soils removed from access routes will be disposed of at an approved landfill.

Northgate anticipates that approximately 4,000 cubic yards of soil will be loaded and transported each day, based on one 12-hour shift (the actual volume being dependent on the number of trucks used and daily conditions). Assuming the use of 38-ton capacity trucks, an estimated average of 150 truckloads will be transported each day. It is anticipated that two shifts will be required during portions of the remediation program. As noted in the project schedule presented in Appendix F, and assuming these volumes, transportation activities are expected to be completed by the end of 2010 as required by NDEP.

3.2.1 Transportation Routes

Transportation routes (visitor and contractor ingress/egress and haul road) to be employed during remediation are described and shown in the Transportation Plan (Appendix E). Transportation times from the Site to disposal facilities will be dependent on the specific excavation location within the Site, location of disposal facility (Apex or US Ecology), weather conditions, and traffic. Maps illustrating the routes from the work area to the above landfills, the estimated travel time, and the contact person, address, and phone number, are presented in Figures 3 and 4 of Appendix E.

In the event of an accident resulting in a spill of soils being transported, the truck driver will immediately contact the Northgate field representative overseeing remediation activities. The Northgate representative will immediately inspect the Site of the accident and notify the remediation project Health and Safety Officer (HSO) and the local emergency management agencies. The potential for immediate threat to workers and people nearby will be evaluated, and the Northgate representative, with input from the HSO and any local agencies involved, will instruct the remediation contractor to immediately take appropriate corrective steps to rectify the problem. Any spilled material will be returned to the truck (or another truck, if the original truck is disabled) and transport to the landfill will be completed. If the spill occurred on a public roadway, the spilled material will be removed with the Transportation Plan (Appendix E).

3.2.2 Soil Unloading

The soil will be transported to and unloaded at Apex Landfill, or another approved land disposal facility. Once transport trucks are in the landfill area, they will be directed to a “working face” where the contents of the truck will be uncovered and dumped. Trucks will then proceed across “rumble strips,” track-out aprons, and wheel washing stations before leaving the landfill to return to the Site.

3.2.3 Dust Control During Transport

As previously noted, soil will be pre-wetted before excavation and soil excavation will be conducted using a water spray as needed for dust suppression. This moisture is not likely to significantly evaporate during travel to the landfill. Loads will also be covered for the duration of travel. Fugitive dust from impacted soils during trucking to the landfill will thereby be prevented. In light of these mitigation measures, air monitoring along the transport route is not planned. Dust creation along the on-Site haul roads will be minimized by regular application of water from water trucks.

3.3 Air Monitoring

Site and perimeter air monitoring will be performed in accordance with the Perimeter Air Monitoring Plan (PAMP; Appendix B) for fugitive dust emissions, chemicals of concern and volatile chemical emissions if any, as described in the PAMP and the HSP. The air monitoring will be used to evaluate the effectiveness of dust control measures in mitigating emissions. If emissions exceed the action levels, actions will be taken in accordance with the PAMP to bring the emissions into conformance with the plan. Actions include additional wetting of the soil, covering of exposed soil stockpiles, use of dust palliatives, ceasing operations if the wind velocity exceeds the value set in the PAMP, and ceasing operations until effective measures are implemented.

3.3.1 Site Monitoring

The Contractor's typical HSP specifies breathing zone and personal air monitoring be conducted within active areas undergoing soil excavation, loading, and unloading. The description of these types of air monitoring is provided below.

3.3.1.1 Breathing Zone Monitoring

Breathing zone monitoring will typically be required for personnel working in active excavation zones where they may be exposed above the exposure action levels as noted in the HSP. The "breathing zone" refers to the area from the top of the shoulders to the top of the head. The protocol for conducting breathing zone monitoring is outlined in the HSP.

Prior to entering an excavation area, the HSO will have established the appropriate level of PPE based on either the previous experience with similar activities conducted elsewhere at the Site, or the results of the personal air monitoring program discussed below. Once work has commenced, breathing zone monitoring will be conducted by measuring total organic vapors (TOV) and dust in air samples every 30 minutes. Decisions to modify PPE will be made by comparing sustained breathing zone TOV (based on photo-ionization detector [PID]) and total dust levels (based on MiniRAM readings) to the criteria presented in the HSP. The HSO may make recommendations to the contractor regarding breathing zone monitoring and appropriate respiratory and personal protection for their workers.

3.3.1.2 Personal Air Monitoring

Personal air monitoring will only be required if breathing zone or work zone monitoring results indicate that exposures over the action level may have occurred. Because there is no reliable method for determining real-time concentrations of most of the Site-related chemical classes, their concentrations in airborne dust will be assessed based on personal air monitoring results. The protocol for personal air monitoring is outlined in the HSP. The results of the personal air monitoring will be evaluated each day to determine if changes in PPE dust control measures are necessary.

3.3.1.3 Perimeter Air Monitoring

A program for monitoring airborne dust at points upwind and downwind of active excavation areas is detailed in the Perimeter Air Monitoring Plan (Appendix B). In addition to the monitors upwind and downwind of the active excavation area, upwind and downwind monitors will also be located at the perimeter of the Site. The results of the monitoring program will be used to determine the effectiveness of the dust control measures being employed, and to indicate whether it is necessary to implement changes to those measures.

3.4 Decontamination Procedures

The specific equipment decontamination procedures that will be conducted during the remediation of Site soils are described in this section. Equipment decontamination will include the following:

- Sampling equipment decontamination will be conducted between individual sampling points to avoid potential cross-contamination as described in the project SOPs (BRC, 2009).
- Minor decontamination such as scraping off of residual soils (i.e., those adhering to equipment) may be conducted as deemed necessary within the work Site.

Construction equipment decontamination will be conducted at the equipment decontamination pad prior to equipment leaving the Site. The following steps will be used to decontaminate construction equipment:

- Personnel will use proper PPE and observe all HSP rules.
- Equipment heavily caked with soil and/or other material will be scraped off with a flatbladed scraper. The scrapings will be placed in the soil staging area for disposal with the excavated soils.

- Equipment will be decontaminated using steam cleaning equipment prior to departure from the work Site. The condensate will be managed as set forth below. As previously noted, prior to accessing unimpacted areas of the Site and public roads, the transport trucks will be driven across gravel track out aprons, with mud scraping and/or use of a water spray to be performed at the dedicated decontamination area as needed to mitigate the potential for impacted Site soils to be spread.

Excavation equipment decontamination will primarily be performed at the designated decontamination area located as shown on Figure 5. This area will be designed by the Contractor. Decontamination water will be pumped from the collection area into a storage tank, which will be periodically sampled and analyzed to determine appropriate disposal. Some additional decontamination areas may also be needed within separate RZs based on the type of activity performed. Supplemental decontamination stations, if any, will be designed to contain waste water and soils generated during decontamination (i.e., bermed, sloped, and lined with plastic sheeting). Rinse water generated at those supplemental stations will be added to the storage tank for the main decontamination area and disposed of with that wastewater. Soils scraped off equipment or the road will be collected, and retained at the Site, until they can be added to truck loads of soils being transported for disposal at the landfill.

4.0 REMOVAL OF HISTORIC MANGANESE TAILINGS

Manganese tailings have been stockpiled and capped with soil over approximately 8.6 acres in the eastern central portion of the Site. This material is a non-hazardous solid waste product generated in the production of electrolytic-grade manganese dioxide. Tronox plans to relocate this historic tailings stockpile to the Apex landfill, consistent with its ongoing transport and disposal of the manganese tailings generated by its current manufacturing operations.

The total volume of the historic manganese tailings stockpile is approximately 213,000 cubic yards (ENSR, 2007). The tailings vary in thickness from approximately 5 to 30 feet. Appendix G includes three cross-sections through the tailings pile, showing the configuration of the tailings pile, and historic surface features that underlie the tailings.

Tronox plans to remove this tailings pile, with NDEP oversight, between May and July, 2010, in accordance with the schedule provided to NDEP. The contractor loading and transporting this material will control dust emissions in accordance with a dust control permit issued by Clark County Department of Air Quality and Environmental Management. The contractor will install various erosion and sediment control measures in accordance with Tronox's existing NPDES storm water permit and SWPPP. These measures include installation of silt fences and gravel bag barriers to limit sediment erosion and retain runoff on the Site.

Prior to completion of the removal and off-Site disposal of the historic manganese tailings, Tronox will submit a confirmation sampling plan for review and approval of NDEP. Based on the approved Plan, Tronox will collect confirmation samples to confirm that the underlying soil is not chemically-impacted.

5.0 REPORTING, DOCUMENTATION, & PUBLIC PRESENTATION ACTIVITIES

Daily logs, field notes, and digital photographs will be prepared to document each day's field activities and relevant observations of Site conditions and remediation progress. During and following completion of the remedial actions at the Site, Northgate will prepare reports to the NDEP to document the progress of remedial activities and the proper completion of remediation. In addition, reporting will be performed in accordance with the various permitting requirements of other involved agencies. The following is a listing of reports that Northgate anticipates will be generated during the remediation project.

- Daily Progress Reports (to be prepared by the selected remediation contractor) documenting daily activities. Northgate will submit these reports to NDEP via e-mail within two business days. In addition to this summary daily report, the contractor will also keep field notes and daily logs;
- Daily photographic and video record. This record will be kept by Northgate documenting remediation activities;
- Interim Status Reports submitted to NDEP on a monthly basis; and
- Removal Action Completion Report.

The above documents will be retained by Northgate for a 5-year period after completion of the work.

5.1 Interim Status Reports

The purpose of the monthly status reports will be to keep the NDEP informed of the progress of remedial activities at the Site. The reports will present a summary of the remediation progress during the previous month, including as appropriate:

- Significant milestones;
- Locations where excavation has been completed;
- Locations where special control measures (except dust control, which is a routine measure) were necessary and/or where excavation had to be prematurely terminated due to any reason; and
- Estimates of volumes of soil excavated, stockpiled and transported off-Site for disposal (monthly and cumulative).

Other information (e.g., discovery of significant environmental conditions previously unidentified) will be provided in the monthly status reports. Interim status meetings will also be conducted by telephone to supplement these written reports.

5.2 Removal Action Completion Report

At the conclusion of remediation, a Removal Action Completion Report will be prepared for each of the RZs (RZ-B through RZ-E). These four reports will document completion of the remediation and will include descriptions of the remediation activities performed, including data collection procedures and a summary of post-remediation Site conditions based on those data. Copies of the daily logs, field notes, Site maps, surveying results (including plan and cross-sectional maps comparing pre-and post-excavation conditions), and pertinent analytical results will be provided. The report will also include a summary of any locations where excavation was prematurely terminated due to the presence of ground water or for any other reason. The results of the closure risk assessment will be included as appendices to the Removal Action Completion Report.

6.0 INSTITUTIONAL AND ENGINEERING CONTROLS

It is Tronox's intent to remove all contaminated soils in the upper 10 feet in accordance with approved NDEP goals. However, as appropriate, in areas of the Site where existing infrastructure or facility operations preclude the removal of soil exceeding remedial goals, engineering controls and/or institutional controls are being considered. Two areas of the Site slated for engineering controls and/or institutional controls are: 1) The vicinity of Ponds GW-11, WC-E and WC-W (located in RZ-D) and 2) the Leach Plant and associated facilities (located in RZ-B). Both of these areas of the Site are operational.

Areas where institutional and/or engineering controls will be proposed will be shown on the individual RZ Excavation Plans for review and approval by NDEP. If institutional and/or engineering controls are necessary within part of a RZ, remediation will proceed in all other areas of the RZ where such controls are not required. All Institutional and Engineering Controls will be subject to NDEP approval.

7.0 SCHEDULE

Northgate plans to initiate soil remediation activities upon NDEP approval of the RAW and associated plans (Appendices B through H). The first task will be to obtain the pertinent permitting for the remediation activities; this will be done as soon as approval of those documents is received. Site preparation (well abandonment, construction of access routes/decontamination pads/wheel washing stations/re-fueling pads, etc.) will then be performed.

Once initiated, Northgate presently estimates the duration of the remediation activities will be completed by the end of 2010. Operations will be conducted in one to two shifts five days a week, as necessary to meet the project schedule. Northgate will maintain and provide a detailed project schedule to NDEP for the remediation effort. A remediation schedule is attached as Appendix F.

8.0 REFERENCES

AECOM, 2009. *Quality Assurance Project Plan*, Tronox LLC Facility, Henderson, Nevada. May 2009.

AECOM, 2008. *Revised Phase B Site Investigation Work Plan, Text, Tables and Figures.* Tronox LLC Facility. Henderson, Nevada. December 2008.

AECOM and Northgate Environmental Management, Inc., 2009. *Quality Assurance Project Plan*, Tronox LLC Facility, Henderson, Nevada. Revised June 18, 2009.

Basic Environmental Company, 2008. *Removal Action Work Plan for Soil, Tronox Parcels "C", "D", "F","G", and "H" Sites, Henderson, Nevada.* July 1, 2008.

Basic Remediation Company (BRC), 2009a. *BRC Standard Operating Procedure (SOP) 06. Sample Management and Shipping*. Revision 4. December 2009.

BRC, 2009b. *BRC Standard Operating Procedure (SOP) 07, Soil Sampling*. Revision 4. December 2009.

BRC, 2009c. *BRC Standard Operating Procedure (SOP) 12. Asbestos Soil Sampling*. Revision 4. December 2009.

BRC, 2009d. *BRC Standard Operating Procedure (SOP) 14. Field Documentation*. Revision 4. December 2009.

BRC, 2009e. *BRC Standard Operating Procedure (SOP) 17. Soil Logging*. Revision 4. December 2009.

BRC, 2009f. *BRC Standard Operating Procedure (SOP) 19. Borehole Abandonment*. Revision 4. December 2009.

BRC, 2009g. *BRC Standard Operating Procedure (SOP) 23. Split Spoon Sampling*. Revision 4. December 2009.

BRC, 2009h. *BRC Standard Operating Procedure (SOP) 31. Equipment Drilling Decon.* Revision 4. December 2009.

BRC, 2009i. *BRC Standard Operating Procedure (SOP) 34. Investigative Derived Waste (IDW) Management.* Revision 4. December 2009.

BRC, 2009j. *BRC Standard Operating Procedure (SOP) 42. Soil Sampling by Geoprobe™ Methods.* Revision 4. December 2009.

ENSR Corporation (ENSR), 2005, *Conceptual Site Model, Kerr-McGee Facility, Henderson, Nevada*, February 2005

ENSR, 2006. *Phase A Site Source Area Investigation Work Plan*. Tronox LLC Facility. Henderson, Nevada. September 2006.

ENSR, 2007. *Volume Determination of Manganese Tailing Pile*, Tronox LLC Facility. Henderson, Nevada. April 2007.

ENSR, 2008. *Phase B Site Source Area Investigation Work Plan*. Tronox LLC Facility. Henderson, Nevada. December 2008.

Nevada Division of Environmental Protection (NDEP), 1994. *Phase II Letter of Understanding between NDEP and Kerr-McGee,* August 15, 1994.

North American Vertical Datum of 1988 (NAV 88). Established in 1991 to replace the National Geodetic Vertical Datum of 1929 (NGVD 29).

Northgate Environmental Management, Inc. (Northgate), 2010a. *Health Risk Assessment Work Plan, Tronox Facility, Henderson, Nevada,* March 2010.

Northgate, 2010b. *Revised Pre-Confirmation Sampling Work Plan, Remediation Zones RZ-A through RZ-E, Phase B Investigation, Tronox Facility, Henderson, Nevada,* March 2010.

United States Department of Labor, Occupational Health & Safety Administration (OSHA). CFR Part 1926, Safety & Health for Construction.

SEPTEMBER 21, 2010

2010 COMPREHENSIVE GROUNDWATER DATA EVALUATION REPORT FORMER MONTROSE AND STAUFFER FACILITIES HENDERSON, NEVADA

REVISION 1.0

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

2010 COMPREHENSIVE GROUNDWATER DATA EVALUATION REPORT

FORMER MONTROSE AND STAUFFER FACILITIES

HENDERSON, NEVADA

REVISION 1.0

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ACRONYMS AND ABBREVIATIONS

1,2-DCB	1,2-Dichlorobenzene
1,4-DCB	1,4-Dichlorobenzene
4,4-DDD	4,4-dichlorodiphenyldichloroethane
4,4-DDE	4,4-dichlorodiphenyldichloroethylene
4,4-DDT	4,4-dichlordiphenyltrichloroethane
alpha-BHC	alpha-Benzene hexachloride
AMPAC	American Pacific Corporation
BCL	NDEP Basic Comparison Level
beta-BHC	beta-Benzene hexachloride
bgs	below ground surface
BHC	Benzene hexachloride
BMI	Black Mountain Industrial Complex
BRC	Basic Remediation Company
CAMU	Corrective Action Management Unit
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid
DVSR	Data Validation Summary Report
EPA	U.S. Environmental Protection Agency
ft/ft	feet per foot
GAC	Granular activated carbon
gamma-bhc	gamma-Benzene hexachloride
GWTS	Groundwater treatment system
H+A	Hargis + Associates, Inc.
MCL	Maximum Contaminant Level
meq/l	milliequivilants per liter
mg/l	milligrams per liter
µg/l	micrograms per liter
Montrose	Montrose Chemical Corporation of California
msl	Mean sea level
NAPL	Non-Aqueous Phase Liquid

ACRONYMS AND ABBREVIATIONS

NDEP	Nevada Division of Environmental Protection
Olin	Olin Corporation
Qal	Quaternary alluvium
RAS	remedial alternatives study
SOPs	Standard operating procedures
SMC	Stauffer Management Company, LLC
SRCs	Site Related Compounds
Stauffer	Stauffer Chemical Company
Syngenta	Syngenta Crop Protection, Inc.
SVOCs	Semi Volatile Organic Compounds
TDS	Total dissolved solids
the Companies	Montrose, SMC/Syngenta, and Olin Corporation
the Site	Henderson, Nevada site
Tronox	Tronox, LLC
UMCf	Upper Muddy Creek Formation
VOCs	Volatile organic compounds
xMCf	Transitional Upper Muddy Creek Formation

2010 COMPREHENSIVE GROUNDWATER DATA EVALUATION REPORT

FORMER MONTROSE AND STAUFFER FACILITIES

HENDERSON, NEVADA

REVISION 1.0

EXECUTIVE SUMMARY

This revised report presents a comprehensive evaluation of the groundwater data collected by the Companies (Stauffer Management Company, LLC/Syngenta Crop Protection, Inc., Montrose Chemical Corporation of California, and Olin Corporation) and others in 2010 at and in the vicinity of the Black Mountain Industrial (BMI) Complex in Henderson, Nevada. The purpose of this evaluation is to describe the current groundwater conditions in the study area, to provide a foundation for development of a groundwater remedial alternatives study (RAS), and identify any data gaps of importance to these alternatives. A study area for data analysis and presentation was developed in the area between Lake Mead Drive to the south and East Sunset Road to the north.

The primary data set used in this evaluation was the second quarter 2010 (annual) joint groundwater Site-Wide monitoring program conducted in accordance with the requirements of the 2010 program. Additional data collected by other entities during calendar year 2010 were also used to supplement the 2010 Site-Wide groundwater data. Groundwater level and chemical quality data were evaluated based on the water bearing zones defined for the study area: Shallow Zone, Middle Zone, and Deep Zone.

Groundwater elevation monitoring during the second quarter of 2010 indicates that the groundwater flow directions and hydraulic gradients in each of the three water bearing zones were consistent with previous data collected in the study area. The overall groundwater flow direction through the study area is toward the north – northeast. Hydraulic gradients in the three water bearing zones range from 0.01 to 0.03 ft/ft. In the Middle Zone, groundwater occurs under confined or semi-confined conditions.

In most locations, groundwater elevations determined at monitor wells completed in the Middle Zone are up to 13 feet higher in elevation compared to groundwater elevations at nearby Shallow Zone monitor wells, suggesting that an upward vertical gradient exists between the Middle and the Shallow Zones. Groundwater elevations measured from monitor wells completed in the Deep Zone are greater than groundwater elevations measured from Middle and Shallow Zone monitor wells, indicating an upward vertical hydraulic groundwater gradient between the Deep Zone and the overlying Middle and Shallow Zones. These data, when considered with lithologic data suggest that the upper portions of the Upper Muddy Creek formation act as a confining unit (or aquitard) between the Deep and Shallow Zones.

The 2010 analytical data for all three water bearing zones were evaluated to develop a list of representative chemical compounds/constituents selected based on prevalence, relative toxicity, a review of their physical/chemical properties. The representative compounds/constituents selected included volatile organic compounds (VOCs) (benzene, chloroform, chlorobenzene, dichlorobenzene isomers), pesticides (benzene hexachloride [BHC] isomers), trace metals (arsenic and uranium), perchlorate, and total dissolved solids (TDS).

The distribution of organic compounds and inorganic constituents was similar to previous data collected in the study area. VOCs detected in the Shallow and Middle Zones continue to be the prevalent compounds detected above their Environmental Protection Agency (EPA) maximum contaminant limits (MCLs) or Nevada Division of Environmental Protection (NDEP) basic comparison levels (BCLs). In the Shallow Zone, there is a wide distribution of VOCs from just north of the Montrose Closed Ponds Area continuing north to the groundwater treatment system (GWTS). Concentrations north of the GWTS have been reduced as compared to upgradient areas indicating that VOCs are largely removed from Shallow Zone groundwater by the GWTS. Middle Zone groundwater sampling results show the presence of both organic and inorganic chemicals. VOCs accounted for a majority of detections above guidance levels in Middle Zone groundwater in 2010. Deep Zone groundwater sampling results showed little dissolved phase compound detections, with a majority being from a single monitor well (DMC-MW-27).

Dense non-aqueous phase liquid (DNAPL) was observed in Middle Zone monitor wells MC-MW-11, MC-MW-12, and MC-MW-18 during the 2010 Site-Wide monitoring round.

DNAPL materials have been detected in these wells in the past; therefore, no DNAPL samples were collected from these wells by the Companies. However, a DNAPL sample was collected from monitor well MC-MW-12 by Basic Remediation Company, Inc. (BRC) and submitted for analysis in April 2010. The results of this sample will be reported by BRC to NDEP under separate cover. No other Company sampled well contained significant DNAPL indicators during monitoring in 2010.

The 2010 data set was evaluated to identify data gaps relevant to the assessment of hydrogeologic conditions. The following data gaps were identified:

1. UMCf mass flux: The hydrogeologic conditions and chemical presence in the Upper Muddy Creek formation in the vicinity of the GWTS have not been sufficiently characterized. This data gap will be addressed as part of the ongoing investigation of the Upper Muddy Creek formation in the GWTS area. A work plan for this investigation (which includes the installation of additional Upper Muddy Creek formation monitor wells near the GWTS) was submitted to and approved by NDEP (H+A, 2010d). This investigation will commence as soon as property access issues are resolved.

2. Monitor Well MC-MW-18: DNAPL materials were identified in monitor well MC-MW-18 in October 2009. The DNAPL materials were confirmed to still be present during the 2010 Site-Wide monitoring event. A DNAPL reconnaissance work plan was submitted to and approved by NDEP (H+A, 2010e). This investigation was initiated on October 4, 2010 and a report will be prepared when the results of the soil and groundwater sampling have been received from the analytical laboratory.

3. Monitor Well DMC-MW-27: Concentrations of VOCs have been detected in Deep Zone monitor well DMC-MW-27. The results of further sampling at monitor well DMC-MW-27 indicates that the concentrations of VOCs are declining. As discussed with NDEP in an October 8, 2010 teleconference, the Companies will perform an extended well purge at DMC-MW-27 in the fourth quarter 2010. The Companies will then continue to monitor water quality conditions at well DMC-MW-27 to help to determine if these chemicals were introduced to the well during the drilling process and are dissipating over time, or if the chemicals are present in Deep Zone groundwater in this area.

The adequacy of the Site-Wide monitoring program was also evaluated to determine if the program provides sufficient data to monitor the groundwater contamination in the study area. The metrics used for evaluating the adequacy of the program included: 1) whether the number and distribution of wells are adequate to identify the contaminant boundaries, 2) whether monitor wells are sufficient near the boundaries to detect contaminant movement, and 3) whether monitor wells are sufficient to define the direction of groundwater movement and changes in groundwater movement. The results of the evaluation of the Site-Wide monitoring program indicate that the program is adequate based on these metrics for the Shallow Zone. However, the evaluation indicates that there are data gaps for the Middle and Deep Zones.

2010 COMPREHENSIVE GROUNDWATER DATA EVALUATION REPORT

FORMER MONTROSE AND STAUFFER FACILITIES

HENDERSON, NEVADA

REVISION 1.0

1.0 INTRODUCTION

This document has been revised by Hargis + Associates, Inc. (H+A) on behalf of Stauffer Management Company, LLC/Syngenta Crop Protection, Inc. (SMC/Syngenta), Montrose Chemical Corporation of California (Montrose), and Olin Corporation (Olin), collectively the Companies, in response to comments received from the Nevada Division of Environmental Protection (NDEP) dated September 21, 2010 . The response to those NDEP comments is provided in Appendix A. The purpose of this comprehensive evaluation of the groundwater data generated by the Companies and others in 2010 in the vicinity of the Black Mountain Industrial Complex (BMI) in Henderson, Nevada is to describe the current groundwater conditions in the study area, evaluate the adequacy of the existing monitoring well fields for each water bearing zone, provide a foundation for development of a groundwater remedial alternatives study (RAS), and identify any data gaps of importance to the groundwater RAS. To avoid duplication in reporting, this document does not evaluate the efficacy of the groundwater treatment system (GWTS) which is being addressed by a separate GWTS capture analysis program.

1.1 BACKGROUND

The Site-Wide groundwater monitoring program was initiated in 2006 and eight sampling events have been completed to date. The original objective of these groundwater sampling events was to define the general character and distribution of Site Related Compounds (SRCs) in groundwater. Data generated from the Site-Wide groundwater monitoring program have been sufficient to characterize the distribution of SRCs and the migration pathways in the study area.

Continued long-term groundwater monitoring is required in the study area and would be appropriate to monitor the spatial distribution of chemicals in groundwater.

Therefore, in 2009 the Companies modified the objectives of the Site-Wide monitoring program to that of long-term routine monitoring and believe there are three main objectives for long-term monitoring at the Site, 1) monitor the location of the plume to assure that it does not deviate from its current location and migration pathway, 2) monitor selected locations within the plume to document the effect and progress of remedial actions, and 3) detect any source of contamination that may migrate into the study area from off-site. This monitoring philosophy was continued in 2010.

2.0 SCOPE OF EVALUATION

The following sections describe the geographical boundaries of the study area and the data evaluated in this comprehensive report.

2.1 GEOGRAPHICAL AREA OF EVALUATION

The 2010 Site-Wide program study area is defined by Lake Mead Drive to the south, the limit of the SRCs to the east and west and just south of East Sunset Road to the north. The study area incorporates the Olin plant facilities, the Basic Remediation Company (BRC) Corrective Action Management Unit (CAMU) Area, the GWTS, the Consent Order monitor well area north of Warm Springs Road, and select PC series monitor wells downgradient of the GWTS (Figure 1).

2.2 EVALUATED DATA

The data set utilized in this evaluation incorporates all groundwater data produced by the Companies in the vicinity of the study area during 2010 as well as data collected by other BMI Companies relevant to the evaluation of conditions within the study area.

The primary data set used in this evaluation was the annual joint groundwater Site-Wide monitoring program conducted in accordance with the requirements of the 2010 program (H+A, 2010a) and NDEP modifications (H+A, 2010b and 2010c). Water level measurements, gauging for the presence of non-aqueous phase liquids (NAPLs), and groundwater sampling were conducted in accordance with applicable standard operating procedures (SOPs) (H+A, 2007).

The annual 2010 Site-Wide monitoring event was conducted during the period of April 21 through May 21, 2010. This event included the collection of water level elevations, gauging for the presence of NAPL, and the collection of groundwater samples for:

- Volatile organic compounds (VOCs) analyzed by US Environmental Protection Agency (EPA) method 8260B,
- Organochlorine pesticides analyzed by EPA method 8081A,
- Selected metals analyzed by EPA methods 6020 and 7470A,
- Perchlorate analyzed by EPA method 6850,
- Total dissolved solids (TDS) analyzed by standard method 2540C, and
- General chemistry.

In addition, groundwater samples from a select set of monitor wells were analyzed for semi volatile organic compounds (SVOCs) by EPA method 8270C or organic acids using high performance liquid chromatography (H+A, 2010a). Water level elevation and NAPL gauging field forms are supplied in Appendix B, while laboratory reports are supplied in Appendix C. A complete data validation summary report (DVSR) was submitted in the original report as Appendix C and will not be included in the revised Deliverable.

The 2010 Site-Wide monitoring program is only a part of the total groundwater monitoring being conducted at the Site. Other programs, as listed below, contribute to the on-going understanding of groundwater conditions in the study area. Other data sets utilized in this evaluation were:

- Montrose semi-annual Closed Ponds Area monitoring program (data set is un validated);
- The Companies quarterly GWTS Consent Order monitoring program (data set is un validated);
- The Companies quarterly GWTS transect monitoring program (data set is un validated);
- The Companies 2010 Annual GWTS extraction well monitoring program (data set is un validated);
- 2010 Tronox monitoring program (perchlorate and TDS only - data set is un validated);
- 2010 BRC CAMU monitoring program (data set is validated), and
- 2010 American Pacific Corporation (AMPAC) monitoring program (perchlorate only - data set is unvalidated).

The results of these additional sampling activities have been integrated in this report, where appropriate, since the data are relevant and provide a more comprehensive overview of study area conditions to evaluate needs for the scope of the program in 2011. Analytical data for all Company and BMI well locations monitored in 2010 are supplied in Appendix D.

3.0 HYDROGEOLOGY ENVIRONMENT

This section summarizes groundwater trends, flow directions and the nature and extent of the detected analytes in groundwater and compares the results to past monitoring events. Discussion of these findings is organized by water bearing zone. The analytes discussed in detail below are those detected most frequently above their respective EPA Maximum Contaminant Limits (MCLs) or NDEP Basic Comparison Levels (BCLs) derived for Residential Tap Water if no MCL exists.

The three primary lithostratigraphic units that comprise the groundwater system beneath the Site are the Quaternary alluvial fan deposits (Qal), the underlying lacustrine Upper Muddy Creek formation (UMCf), and the transitional Muddy Creek Formation (xMCf) that occurs between the two. Groundwater is present within the Qal deposits and both the xMCf and UMCf in the study area.

3.1 SHALLOW ZONE

For this report, saturated Qal and xMCf deposits are referred to as the Shallow Zone hydrogeologic unit where saturation occurs under unconfined conditions (NDEP, 2009a). It is recognized that in some areas at the Site, the xMCf is not present. In these areas the Shallow Zone may be made up of Qal and the upper portions of the UMCf. Locations of the Shallow Zone monitor wells utilized in this evaluation are shown in Figure 2. Specific Shallow Zone monitor well details are presented in Table 1.

3.1.1 Depth to Groundwater and Elevations

In the second quarter 2010 depths to groundwater in the Shallow Zone ranged from 7.56 feet below ground surface (bgs) at monitor wells MW-A-J to 70.28 feet bgs at monitor well H-11. These depths to groundwater are consistent with previous monitoring events, as were depths to water being shallowest in the north near East Sunset Road and deepest in the south near Lake Mead Parkway.

Groundwater elevations in the Shallow Zone were highest in the southern portion of the study area decreasing in elevation to the north and northeast across the study area (Table 2, Figure 3).

Groundwater elevations in the study area ranged from approximately 1,797 feet mean sea level (msl) near Lake Mead Parkway to approximately 1,640 feet msl south of East Sunset Road. These conditions are similar to that reported for 2009 (H+A, 2010g). Field forms used during water level measurements and NAPL gauging are included in Appendix B.

Historically, groundwater elevations in the Shallow Zone have either risen or not varied significantly over time (Figure 4). The monitor wells depicted in Figure 4 (MW-01, B-01, B-04, EC-01, H-21R, and H-49A) are representative of the historical groundwater conditions in the Shallow Zone and were chosen because of location and historical longevity of their data set. In general, Shallow Zone groundwater has risen over the past five years as noted below:

- Shallow Zone groundwater elevations in the southern portion of the study area near monitor well MW-01 have risen approximately 7 feet over the past 5 years.
- Shallow Zone groundwater elevations near the Montrose Former Plant Site in the vicinity of monitor well B-01 have risen approximately 2 feet over the past 5 years.
- Shallow Zone groundwater elevations north of the former plant site up to the GWTS (EC-02 and H-21R) have shown less change in the past 5 years rising less the 2 feet.
- Shallow Zone groundwater elevations near Warm Springs Road (H-49A) have risen over 5 feet in the past 5 years.

3.1.2 Groundwater Gradient and Flow Direction

The overall slope of the Shallow Zone groundwater surface is similar to the slope of the land surface in the study area (Figure 3). Land surface elevations in the southern portions of the study area range from approximately 1,850 to 1,860 feet above msl. Land surface elevations in the northern portions of the study area, south of East Sunset Road, range from approximately 1,660 to 1,675 feet above msl. Shallow Zone groundwater flow occurs in a north – northeast direction through the study area (Figure 5).

The hydraulic gradient in the southern portion of the study area to the former Montrose and Stauffer facilities ranged between approximately 0.01 and 0.03 feet per foot (ft/ft) during the second quarter 2010. The gradient decreases to approximately 0.01 ft/ft north of the former facilities (Figure 5). The change in gradient across the study area is likely due to the changes in the lithology of the Shallow Zone.

A review of historic well data and recent drilling and well construction within the study area indicate that the Shallow Zone becomes thicker and generally coarser-grained in the area north of the former Montrose and Stauffer facilities compared to the southern portion of the study area (H+A, 2008).

3.1.3 Shallow Zone Chemical Concentrations and Distribution

Groundwater samples were collected from 31 Shallow Zone monitor wells located in the study area during the 2010 Site-Wide monitoring event. In addition, groundwater samples were also collected from 14 Shallow Zone monitor wells on the boundary of the BRC CAMU area, 4 Shallow Zone monitor wells north of the Montrose Closed Ponds Area, 16 extraction wells at the GWTS and 12 Consent Order and transect wells near the GWTS. The discussions below incorporate water quality data from these additional monitor wells.

Based on the comprehensive laboratory analytical program for analysis of groundwater samples collected during the 2010 Site-Wide investigation the analytical data were evaluated to develop a list of representative chemical compounds in Shallow Zone groundwater that will be discussed in detail to illustrate the extent of chemical compounds at the Site. Factors that were used in developing this list included prevalence of the chemical in 2010 samples from the Shallow Zone, relative toxicity of the compound, and a review of the physical/chemical properties of the compound. Table 3 presents the prevalence of compounds detected in the Shallow Zone. The prevalence table shows compounds that satisfy the following criteria:

- An agency guidance level (MCL or BCL) is established for the compound and
- A concentration that exceeded one of the guidance levels (BCL or MCL) was detected in at least one of the samples taken in the second quarter 2010.

The remaining compounds were then reviewed for their prevalence at concentrations above their MCLs or BCLs and their relative toxicity. A review of the physical/chemical properties of the remaining compounds including density, vapor pressure, solubility, Henry's Law constant, and the octanol/water partition coefficient was then completed (see Tables 4-8 and 4-8a in the Conceptual Site Mode [CSM], H+A, 2008). The identified compounds resulting from this evaluation are discussed in detail below.

Consistent with the information presented in the CSM (H+A, 2008), chemical concentrations in Shallow Zone groundwater are highest in the former facilities areas and decrease significantly across the GWTS area as a result of extraction and treatment of impacted groundwater (Figures 6 through 17).

3.1.3.1 Volatile Organic Compounds

Concentrations of 16 different VOCs greater than their respective primary MCLs or BCLs were detected in groundwater samples collected in 2010 (Table 3). The groundwater samples were collected from monitor wells located immediately north of the Montrose Closed Ponds, extending north into the area of the former Montrose and Stauffer facilities, and continuing north to the GWTS (Figures 6 through 10). Concentrations of VOCs immediately north of the GWTS are either not detected or are significantly less than those observed upgradient of the GWTS; indicating the effectiveness of the system in removing VOCs from the Shallow Zone. The distribution of VOCs is consistent to that defined in the CSM, and reported in 2009 (H+A, 2008, and 2010g).

Within the study area, concentrations of the prevalent VOCs benzene, chlorobenzene, chloroform, 1,2-dichlorobenzene (1,2-DCB), and 1,4-dichlorobenzene (1,4-DCB) were consistently detected above their MCLs (Table 3) and varied at each individual monitor well during the period of record. However, the concentrations of these VOCs measured in 2010 remained within their historic range. Figures illustrating the concentration contours of benzene, chlorobenzene, chloroform, 1,2-DCB, and 1,4-DCB have been prepared to denote chemical character and distribution throughout the study area (Figures 6 through 10).

Benzene

The distribution of benzene in Shallow Zone groundwater in the study area is shown on Figure 6. Benzene was detected above laboratory detection limits in 52 of the 76 groundwater analyses from the Shallow Zone in 2010 (approximately 68 percent) (Table 3). Detectable benzene concentrations in Shallow Zone groundwater ranged from 0.28 to 720,000 micrograms per liter (µg/l). The maximum benzene concentration was detected at Shallow Zone monitor well EC-03. Benzene was detected in 39 groundwater samples at concentrations above the MCL for benzene of 5 µg/l (approximately 51 percent of the total number of samples).

Benzene was not detected in the Shallow Zone upgradient of the former facilities with the exception of a single detection of benzene in monitor well H-11 at a concentration of 0.34 µg/l (Figure 6). Benzene was not detected in Tronox area monitor wells east of monitor well M-125. Benzene was detected above the MCL in the Shallow Zone over a broad area beneath former facilities, beneath the BRC CAMU, and near the GWTS (Figure 6). The highest benzene concentrations are detected in the central portion of the Olin property. The extent of benzene in the Shallow Zone between Lake Mead parkway and the GWTS is well defined.

Benzene was not detected above the MCL in Shallow Zone groundwater downgradient (north) of the GWTS with the exception of samples collected from monitor well H-49A (7.5 µg/l) and MW-A-J (7.8 µg/l). The extent of benzene in the Shallow Zone downgradient of monitor well H-49A was defined by the laboratory analytical results of groundwater samples collected from H-56A, H-58A, MW-R, PC-028, PC-031, PC-064, and PC-067, respectively, which did not contain benzene at concentrations at or above the MCL of 5.0 µg/l. The concentration of benzene in monitor well MW-A-J (7.8 µg/l) was slightly greater than the MCL of 5.0 µg/l.

Based on the reduction of benzene concentrations downgradient of the GWTS, the GWTS appears to be effective at controlling the migration of benzene in the Shallow Zone groundwater (Figure 6). The effectiveness of the GWTS is also demonstrated by the decrease of benzene in groundwater samples collected at monitor well MC-114. Monitor well MC-114 is located along Warm Springs Road downgradient of the GWTS and is part of the Companies' quarterly transect monitoring program (Figure 6). A summary of the quarterly groundwater sampling data from monitor well MC-114 is reported in H+A, 2010f. Review of the data indicates that concentrations of benzene have decreased from 2,000 µg/l to less than the limit of detection during the period January 2009 to January 2010. The decrease in benzene is due to the additional extraction wells (specifically extraction well M2), rehabilitation of existing extraction wells, and increased pumpage of impacted groundwater in the eastern portion of the GWTS.

Chlorobenzene

The distribution of chlorobenzene in Shallow Zone groundwater at the Site is shown on Figure 7. Chlorobenzene was detected above laboratory detection limits in 63 of the 76 groundwater analyses from the Shallow Zone in 2010 (approximately 83 percent) (Table 3).

Detectable chlorobenzene concentrations in Shallow Zone groundwater ranged from 0.36 to 260,000 µg/l. The maximum chlorobenzene concentration was detected in Shallow Zone monitor well AA-BW-08A. AA-BW-08A is located on the southern edge of the BRC CAMU area. The MCL and BCL for chlorobenzene is 100 µg/l. Chlorobenzene was detected in 41 analyses above the MCL (approximately 54 percent of the total number of samples).

Chlorobenzene was detected in the Shallow Zone upgradient of the former operational areas (Figure 7). Samples from upgradient monitor wells AA-MW-24, H-11, and MW-01 showed chlorobenzene concentrations of 0.36, 0.66, and 0.64 µg/l, respectively, well below guidance levels.

Chlorobenzene was not detected above its MCL in Tronox area monitor wells east of monitor well M-125. Chlorobenzene was detected above its MCL in the Shallow Zone over large portions of the former operational areas, beneath the BRC CAMU, and near the GWTS. The highest chlorobenzene concentrations are detected in two areas 1) north of the former Montrose facilities and 2) the south central border of the BRC CAMU to north central border of the BRC CAMU. The extent of chlorobenzene in the Shallow Zone is well defined.

With the exception of monitor well H-49A and MC-49, chlorobenzene was not detected above the MCL in Shallow Zone groundwater downgradient of the GWTS. The extent of chlorobenzene in the Shallow Zone downgradient of monitor well H-49A and MC-49 is defined by the laboratory analytical results of groundwater samples collected from H-56A, H-58A, MW-A-J, MW-R, PC-028, PC-031, PC-064, and PC-067, respectively, which did not contain chlorobenzene at concentrations at or above the MCL of 100 µg/l.

Based on the reduction of chlorobenzene concentrations downgradient of the GWTS, the GWTS appears to be effective at controlling the migration of chlorobenzene in the Shallow Zone groundwater (Figure 7). The effectiveness of the GWTS is also illustrated by the decrease of chlorobenzene in groundwater samples collected from monitor well MC-114, similar to that of benzene noted above.

Chloroform

The distribution of chloroform in Shallow Zone groundwater in the study area is shown on Figure 8. As shown, chloroform was detected above laboratory detection limits in 67 of the 76 groundwater samples from the Shallow Zone in 2010 (approximately 88 percent) (Table 3).

Detectable chloroform concentrations in Shallow Zone groundwater samples ranged from 0.2 to 96,000 µg/l. The maximum chloroform concentration was detected in Shallow Zone monitor well MW-02 immediately north of the Montrose Closed Ponds Area. The maximum concentration of chloroform is greater than the MCL for total trihalomethanes (which includes chloroform) of 80 µg/l. Chloroform was detected in 28 samples above the MCL (approximately 37 percent of the total number of samples).

Chloroform was detected in Shallow Zone monitor wells AA-MW-24 and MW-01 located upgradient of the former facilities (Figure 8). Samples from upgradient monitor wells AA-MW-24 and MW-01 showed chloroform concentrations of 42 and 2.3 µg/l, respectively, well below the MCL.

Chloroform was detected above the MCL in the Shallow Zone beneath large portions of the former facilities, near the eastern end of GWTS, and east of the study area in the Tronox and Timet facility areas (based on 2009 data).

Review of the Shallow Zone chloroform data indicates that there is a low concentration zone, or separation, between the two high concentration areas located beneath the former Montrose and Stauffer facilities and the Tronox facility to the east (Figure 8). This low concentration area is present along the property boundary between Olin and Tronox. Concentrations in this area range from 2.3 µg/l to 46 µg/l, whereas chloroform concentrations to the east and west of this area are as high as 3,100 µg/l and 100,000 µg/l, respectively. These data, along with the northerly groundwater flow direction suggest the elevated concentrations of chloroform to the east of the Companies site are not attributable to source areas at the former Montrose or Stauffer facilities.

Chloroform was also detected above the MCL in Shallow Zone groundwater in an area northeast of the GWTS near monitor well PC-028 and PC-067. Based on the reduction in chloroform concentrations across the GWTS area, the GWTS appears to be effective at controlling a majority of the migration of chloroform in Shallow Zone groundwater that is a result of source areas in the vicinity of the former Montrose and Stauffer facilities (Figure 8).

1,2-Dichlorobenzene

The distribution of 1,2-DCB in Shallow Zone groundwater in the study area is shown on Figure 9.

1,2-DCB was detected above laboratory detection limits in 60 of the 79 groundwater samples from the Shallow Zone in 2010 (approximately 76 percent) (Table 3). Detectable 2010 1,2-DCB concentrations in Shallow Zone groundwater ranged from 0.094 to 30,000 µg/l. The maximum second quarter 2010 1,2-DCB concentration was detected in Shallow Zone monitor well AA-MW-14 located within the Former Montrose Plant Site. The maximum concentration of 1,2-DCB is greater than its MCL of 600 µg/l. 1,2-DCB was detected in 19 samples above the MCL (approximately 24 percent of the total number of samples in 2010).

1,2-DCB was detected in the Shallow Zone upgradient of the former operational areas (Figure 9). Samples from upgradient monitor well MW-01 showed 1,2-DCB concentrations of 3.8 µg/l, below the MCL.

1,2-DCB was detected above the MCL in the Shallow Zone beneath and downgradient of the Montrose Former Plant Site and Closed Ponds Area extending north through the BRC CAMU area and terminating at the GWTS between extraction wells P and K2. In general, 1,2-DCB concentrations decrease from the operational areas in the southern portion of the study area to the GWTS. 1,2-DCB was not detected above its MCL in Shallow Zone groundwater downgradient of the GWTS or in the Tronox facilities to the east. The extent of 1,2-DCB in the Shallow Zone is well defined. Based on the reduction of 1,2-DCB concentrations across the GWTS area, the GWTS appears to be effective at controlling the migration of 1,2-DCB in the Shallow Zone groundwater (Figure 9).

1,4-Dichlorobenzene

The distribution of 1,4-DCB in Shallow Zone groundwater in the study area is shown on Figure 10. 1,4-DCB was detected above laboratory detection limits in 58 of the 79 groundwater samples from the Shallow Zone in 2010 (approximately 73 percent) (Table 3). Detectable 1,4-DCB concentrations in Shallow Zone groundwater ranged from 0.13 to 32,000 µg/l. The maximum 1,4-DCB concentration was detected in Shallow Zone monitor well AA-MW-14 located within the Montrose Former Plant Site. The maximum concentration is greater than the MCL for 1,4-DCB of 75 µg/l. 1,4-DCB was detected in 32 samples at concentrations greater than its MCL (approximately 41 percent of the total number of samples).

1,4-DCB was detected in the Shallow Zone upgradient of the former operational areas (Figure 10). Samples from upgradient monitor well MW-01 showed 1,4-DCB concentrations of 1.7 µg/l, well below the MCL. (Figure 10).

1,4-DCB was detected above the MCL in the Shallow Zone beneath and downgradient of the Montrose Former Plant Site and Closed Ponds Area. The highest 1,4-DCB concentrations are detected in the area immediately north of the Closed Ponds Area extending north towards the Former Plant Site (Figure 10). 1,4-DCB concentrations decrease from the operational areas in the southern portion of the study area to the GWTS. 1,4-DCB was not detected above the MCL in Shallow Zone groundwater downgradient of the GWTS or at the Tronox facilities. The extent of 1,4-DCB in the Shallow Zone is well defined.

All detectable concentrations of 1,4-DCB downgradient of the GWTS are below guidance levels. Based on the substantial reduction of 1,4-DCB concentrations across the GWTS area, the GWTS appears to be effective at controlling the migration of 1,4-DCB in the Shallow Zone groundwater (Figure 10).

3.1.3.2 Pesticides

Concentrations of six different pesticides greater than their respective BCLs and one pesticide (gamma benzene hexachloride) greater than its MCL were detected in groundwater samples from Shallow Zone monitor wells (Table 3). Benzene hexachloride (BHC) isomers (i.e., alpha-, beta-, and gamma -) account for three of the six pesticide compounds detected and 142 of 155 (approximately 92%) of all pesticide detections in 2010 (Table 3). The distribution of BHC isomers in groundwater is described below. Chemical contour maps depicting the distribution of alpha-, beta-, and gamma-BHC are included as Figures 11 through 13.

Alpha-BHC

The distribution of alpha-BHC in Shallow Zone groundwater in the study area is shown on Figure 11. Alpha-BHC was detected above laboratory detection limits in 63 of the 73 groundwater samples from the Shallow Zone monitor wells in 2010 (86 percent). Detectable alpha-BHC concentrations ranged from 0.004 µg/l to 740 µg/l. Alpha-BHC was detected in 58 samples at concentrations above the BCL for alpha-BHC of 0.0107 µg/l (approximately 73 percent of the total number of samples).

Alpha-BHC was not detected in the Shallow Zone groundwater upgradient of the former operational areas (Figure 11). Alpha-BHC was detected above the BCL in the Shallow Zone groundwater beneath and downgradient of the Montrose Former Plant Site and Closed Ponds Area.

The highest alpha-BHC concentrations in Shallow Zone groundwater are found in two areas; 1) at Shallow Zone monitor well EC-03 (370 µg/l), north of the former Lindane Plant and Former BHC Cake Piles 1 and 2, and 2) at Shallow Zone monitor well AA-BW-08A (740 µg/l) located along the northern boundary of the Site in the vicinity of the former BMI slit trenches. Alpha-BHC concentrations decrease from the operational areas in the southern portion of the study area to the GWTS. Alpha-BHC was detected in all groundwater samples downgradient of the GWTS above the BCL in Shallow Zone groundwater except for the sample collected from well PC-028. Alpha-BHC was not detected above its BCL in Tronox area monitor wells east of monitor well M-125. The extent of alpha-BHC in the Shallow Zone is well defined to the south and east of the study area and is characterized by monitor wells EC-10 and B-16 to the west.

All detectable concentrations of alpha-BHC downgradient of the GWTS are substantially lower than concentrations directly upgradient of the GWTS; however concentrations downgradient of the GWTS are still above the BCL. The granular activated carbon (GAC) absorption system for treatment of BHC isomers (and other non-volatile chemicals) has been in place since July 2005. Given the relatively low mobility of the BHC isomers, the reduction in concentrations downgradient of the GWTS would be anticipated to occur more slowly than has been observed for the more mobile VOCs. However, as has been previously observed with VOCs, BHC concentrations in downgradient groundwater are expected to show long term decline with continued operation of the GAC.

Beta-BHC

The distribution of beta-BHC in Shallow Zone groundwater in the study area is shown on Figure 12. Beta-BHC was detected above laboratory detection limits in 45 of the 72 analyses from the Shallow Zone groundwater in 2010 (63 percent) Detectable beta-BHC concentrations ranged from 0.01 µg/l to 110 µg/l. Beta-BHC was detected in 43 samples at concentrations above the BCL for beta-BHC of 0.0374 µg/l (approximately 60 percent of the total number of samples).

Beta-BHC was not detected in the Shallow Zone groundwater upgradient of the former operational areas (Figure 12). Beta-BHC was detected above the BCL in the Shallow Zone groundwater beneath and downgradient of the Montrose Former Plant Site and Closed Ponds Area.

The highest beta-BHC concentrations in Shallow Zone groundwater are found in two areas; 1) at Shallow Zone monitor well EC-03 (91 µg/l) north of the former BHC Cake Piles 1 and 2, and 2) at Shallow Zone monitor well AA-BW-08A (110 µg/l) located along the northern boundary of the Site in the vicinity of the former BMI Slit Trenches Beta-BHC concentrations decrease from the operational areas in the southern portion of the study area to the GWTS. Beta-BHC was detected in three of six groundwater samples collected downgradient of the GWTS above the BCL. Beta-BHC was not detected above its BCL in Tronox area monitor wells. The extent of beta-BHC the Shallow Zone is well defined to the south and east of the study area and is constrained by monitor wells EC-04 and B-16 to the west.

Gamma-BHC

The distribution of gamma-BHC in Shallow Zone groundwater in the study area is shown on Figure 13. Gamma-BHC was detected above laboratory 34 of the 73 analyses from the Shallow Zone groundwater on 2010 (47 percent). Detectable gamma-BHC concentrations ranged from 0.33 µg/l to 180 µg/l. Gamma-BHC was detected in 15 samples at concentrations above the MCL and BCL for gamma-BHC of 0.20 µg/l (approximately 21 percent of the total number of samples).

Gamma-BHC was not detected in the Shallow Zone upgradient of the former operational area (Figure 13). Gamma-BHC was detected above the MCL in the Shallow Zone beneath and downgradient of the Montrose Former Plant Site and Closed Ponds Area. The highest gamma BHC concentrations are found in two areas; 1) at Shallow Zone monitor well EC-03 (180 µg/ north of the former BHC Cake Piles 1 and 2, and 2) at Shallow Zone monitor well AA-BW-08 (58 µg/l) located along the northern boundary of the Site in the vicinity of the former BMI S Trenches. Gamma-BHC concentrations decrease from the operational areas in the southe portion of the study area to the GWTS. Gamma-BHC was not detected above the MCL groundwater samples collected downgradient of the GWTS. Gamma-BHC was not detecte above its BCL in Tronox area monitor wells to the east of the Site. The extent of gamma-BH the Shallow Zone is well defined.

Other Pesticides

Concentrations of 4 other pesticides were detected at concentrations greater than th respective BCLs in 2010 Site-Wide groundwater samples from Shallow Zone monitor we (Table 3).

These pesticides were: 4,4-dichlorodiphenyldichloroethylene (4,4-DDE), 4,4-dichlordiphenyltrichloroethane (4,4-DDT), aldrin, and dieldrin. 4,4-DDT was detected at concentrations greater than its BCL (0.198 µg/l) in approximately 3 percent of analyses (two samples), 4,4-DDE was detected at concentrations detected greater than its BCL (0.198 µg/l) in approximately 1 percent of analyses (one sample), aldrin was detected at concentrations greater its BCL (0.004 µg/l) in approximately 3 percent of analyses, and dieldrin was detected at concentrations greater its BCL (0.004 µg/l) in approximately 1 percent of analyses (Table 3).

3.1.3.3 Metals

Concentrations of six different metals greater than their respective MCLs were detected in 2010 groundwater samples from Shallow Zone monitor wells located immediately north of the Montrose Closed Ponds Area, extending north into the area of the former Montrose, Stauffer, and current Olin facilities, and continuing north to the GWTS. Arsenic and uranium make up the majority of metal detections accounting for 112 of the 205 (approximately 55%) of all metals detections (Table 3). For the purposes of this evaluation, the distributions of arsenic and uranium detected in groundwater samples were evaluated in detail (Figures 14 and 15).

Arsenic

The distribution of arsenic in Shallow Zone groundwater is shown in Figure 14. Arsenic is a naturally occurring metal in Shallow Zone groundwater in the study area (H+A, 2008). Arsenic was detected above laboratory detection limits in 60 of the 60 groundwater analyses from the Shallow Zone (Table 3). Detectable arsenic concentrations in Shallow Zone groundwater in 2010 ranged from 0.24 to 1,900 µg/l. The maximum arsenic concentration was detected in Shallow Zone monitor well AA-MW-13 located west of the Montrose Former Plant Site. The maximum concentration detected is greater than the MCL for arsenic of 10 µg/l. Arsenic was detected in 57 samples above its MCL (approximately 95 percent of the total number of samples).

Arsenic was detected above the MCL in the Shallow Zone over large portions of the Olin and Tronox properties, beneath the BRC CAMU, and near the GWTS (Figure 14). Groundwater samples taken from monitor wells downgradient of the GWTS showed concentrations ranging from 77 (MW-A-J) to 230 µg/l (PC-064 and PC-028). The highest arsenic concentrations were detected in the southwestern portion of the Olin property, the eastern edge of the BRC CAMU facility, and in northern portions of the Tronox property.

Uranium

The distribution of uranium in Shallow Zone groundwater is shown in Figure 15. Uranium is a naturally occurring metal in Shallow Zone groundwater in the study area (H+A, 2008). Uranium was detected above laboratory detection limits in 52 of the 60 groundwater analyses from the Shallow Zone (approximately 87 percent) (Table 3). Detectable uranium concentrations in Shallow Zone groundwater in 2010 ranged from 0.18 to 390 µg/l.

The maximum uranium concentration was detected in Shallow Zone monitor well AA-BW-09A located on the southeastern end of the BRC CAMU. The maximum concentration detected is greater than the MCL for uranium of 30 µg/l. Uranium was detected in 22 samples above the MCL (approximately 37 percent of the total number of samples).

Uranium was detected above the MCL in the Shallow Zone over large portions of the Olin property, beneath the eastern portions of the BRC CAMU, east of the GWTS, and downgradient of the GWTS (Figure 15). Uranium concentrations from monitor wells downgradient of the GWTS ranged from 8.8 µg/l (PC-031) to 190 µg/l (PC-067). The highest uranium concentrations were detected in the south portion of the BRC CAMU property.

Other Metals

Mercury, chromium, lead, and selenium were detected at concentrations greater than their respective MCLs in 2010 Site-Wide groundwater samples from Shallow Zone monitor wells (Table 3). Mercury was detected at concentrations greater than its MCL (3.0 µg/l) in one sample (2 percent of analyses), chromium was detected at concentrations greater than it's MCL of 100 µg/l in five samples (8 percent of analyses), lead was detected at concentrations greater than its MCL (15 µg/l) in one sample (2 percent of analyses), and selenium was detected at concentrations greater its MCL (50 µg/l) in one sample (2 percent of analyses) (Table 3).

3.1.3.4 Other Inorganic Constituents

Concentrations of three other inorganic constituents greater than their respective BCLs, three greater than their MCLs, and TDS were detected in 2010 groundwater samples from Shallow Zone monitor wells located immediately north of the Montrose Closed Ponds, extending north into the Olin facilities, and continuing north to the GWTS. Perchlorate and TDS make up the majority of inorganic detections accounting for 103 of the 254 (approximately 40%) of all detections. For the purposes of this evaluation, the distributions of perchlorate and TDS detected in groundwater samples were evaluated (Figures 16 and 17).

Perchlorate

The distribution of perchlorate in Shallow Zone groundwater is shown in Figure 16. In addition to the Shallow Zone monitor wells mentioned above, data collected in 2009 from Tronox and AMPAC was used in contouring to further illustrate the areal extent of perchlorate. Perchlorate was detected above laboratory detection limits in 47 of the 59 groundwater analyses from the Shallow Zone (approximately 80 percent) (Table 3). Detectable perchlorate concentrations in Shallow Zone groundwater samples collected in the study area in 2010 ranged from 0.29 to 570,000 µg/l. The maximum perchlorate concentration was detected in Shallow Zone monitor well M-64 located in the northern part of the Tronox facility. Detectable perchlorate concentrations in Shallow Zone groundwater samples collected by Tronox east of the study area ranged from 35 to 5,700,000 µg/l. The maximum concentration detected is greater than the BCL for perchlorate of 18 µg/l. Perchlorate was detected in 33 samples above the BCL (approximately 56 percent of the total number of samples).

The highest perchlorate concentrations are observed in two areas: 1) northwest of the former facilities and BRC CAMU property, near the AMPAC wells to the west, and the two western most GWTS extraction wells, and 2) north and east of the property boundary between Olin and Tronox. Perchlorate is not found in the area of the former Montrose and Stauffer facilities, Closed Ponds Area, or BRC CAMU area in concentrations greater than 1,000 µg/l (Figure 16). The highest concentration detected near the former facilities area is 280 µg/l from Shallow Zone monitor well AA-MW-13.

Total Dissolved Solids

The distribution of TDS in Shallow Zone groundwater is shown in Figure 17. In addition to the Shallow Zone monitor wells mentioned above, data from the Tronox sampling round was used in contouring the areal extent of TDS. Based on 56 analyses, detectable TDS concentrations in 2010 ranged from 890 to 45,000 mg/l in the Shallow Zone (Table 3). The minimum and maximum TDS concentrations in the Shallow Zone were detected at monitor well H-11 and extraction well K2, respectively (Figure 17).

3.1.3.5 Distribution of Other Detected Compounds

There were additional chemicals that were detected in Shallow Zone groundwater samples at concentrations that exceeded the MCL or BCL (Table 3).

The chemicals that exceeded the MCLs or BCLs are from the following chemical groups:

- VOCs;
- SVOCs;
- Inorganics, and
- Organic Acids.

VOCs are the most prevalent chemicals detected in the groundwater at concentrations exceeding MCLs or BCLs, which is consistent with historical study area findings (H+A, 2008). No unusual chemical distribution patterns or relationships to source areas were identified in the 2010 data set.

3.1.3.6 Cation – Anion Analyses

In addition to the above analyses, cation-anion balances were calculated from data generated by the 2010 groundwater monitoring event. The results of this evaluation for the Shallow Zone are shown in Table 4. The variance between cation and anion sums was calculated based on recent NDEP guidance (NDEP, 2009b). The variance between the cation and anion sums ranged between -19.5 and 11 percent. 15 of the 46 samples used in the Shallow Zone cation-anion balance calculations had a variance greater than the acceptable ±5 percent range (Table 4). These samples were collected from AA-MW-13, EC-03, EC-04, H-11, M-064, M-142, MC-09R, PC-028, PC-064, Well A, Well B, Well C, Well D2, Well K2, Well K2, and Well M2. It is important to note that balance results may be influenced by dilution requirements, matrix interference, and elevated sample results.

In addition, TDS checks were evaluated by comparing the measured laboratory TDS to calculated TDS (NDEP, 2009b). 29 of 46 groundwater samples were within the acceptable ratios of 1.0 – 1.2 (Table 4). No anion sum was greater than 800 milliequivalents per liter (meq/l); therefore, no charge balance error check were required (NDEP, 2009b).

3.1.3.7 Field Parameters

Dissolved oxygen, oxidation-reduction potential, and pH are parameters in groundwater that can help further determine bacterial metabolisms of dissolved organic species as wells as the valence state of trace metals in groundwater. As part of the field sampling SOPs (H+A, 2007), these parameters were monitored in the field while the pre – sampling well purge took place (Appendix B).

Figure 18 shows the distribution of the parameters in Shallow Zone groundwater. pH in Shallow Zone groundwater ranged from 5.26 (M-142) to 10.92 (AA-MW-13), dissolved oxygen ranged from 0.00 mg/l in a majority of the monitor wells to 7.37 mg/l (M-092), and redox potential ranged from -256 millivolts (mV) at H-55 to 254 mV at H-56A.

3.1.4 Evaluation of Shallow Zone Monitoring

An evaluation of the adequacy of the Shallow Zone monitoring program was conducted to determine if the program provided sufficient data to monitor the groundwater contamination in the study area. The metrics used for evaluating the adequacy of the program included:

- Whether the number and distribution of monitor wells are adequate to identify the contaminant boundaries;
- Whether monitor wells are sufficient near the plume boundaries to detect contaminant movement; and
- Whether monitor wells are sufficient to define the direction of groundwater movement and changes in groundwater movement.

Contaminant Boundaries – Organic Compounds

A review of the water quality figures prepared with the 2010 monitoring data indicated that the number and distribution of monitor wells was sufficient to identify the area and boundaries where most of the predominant contaminants were present at concentrations greater than their respective MCLs (Figures 6 through 17). There were several Shallow Zone monitor wells that are located along the western, southern, and eastern portions of the study area where most of the predominant VOCs and gamma-BHC were either not detected or were detected at concentrations less than their respective MCLs,

However, there were some areas where the extent of certain VOCs are not completely defined. Benzene and chlorobenzene were detected in groundwater samples at monitor wells located north of the GWTS at concentrations greater than their respective MCLs. These detections were limited in extent and their concentrations were orders-of-magnitude less than those concentrations detected in samples collected upgradient of the GWTS. However, the Companies are continuing to improve the capture efficiency of the GWTS (H+A, 2010d and 2010h) and it is anticipated that detections of VOCs downgradient of the GWTS will decrease as improvements to the GWTS occur.

This is a trend that was established several years ago when the Companies initiated a series of upgrades to the GWTS. In the interim, the performance of the GWTS and concentrations of VOCs are monitored by transect wells and Consent Order wells that have been installed downgradient of the GWTS. These data are reported to NDEP in quarterly data submittals.

Additionally, the eastern extent of chloroform in the Shallow Zone is beyond the study area boundary. Monitor wells sampled by the Companies in 2010 do not define the extent of chloroform to its MCL. However, data generated by the Companies combined with the data from the Tronox and Timet facilities define the extent of chloroform to its applicable MCL.

Contaminant Boundaries – Inorganic Constituents

Water quality figures for the inorganic constituents arsenic, uranium, perchlorate, and TDS were also reviewed as part of this evaluation. Only arsenic and uranium have MCLs. Arsenic is a naturally occurring constituent in groundwater and is routinely detected in samples collected throughout the study area. Based on this condition, identifying the MCL boundary for arsenic is not practicable for the study area.

However, the Shallow Zone monitoring program is sufficient to define where arsenic is most elevated in the study area; that area extending from the former facilities area in the south to the GWTS area in the north (Figure 14).

Uranium is also a naturally occurring constituent in groundwater and is detected in groundwater samples collected throughout most of the study area. However, a review of the 2010 monitoring event data indicates that the number and distribution of monitor wells is sufficient to determine the plume boundary for uranium (Figure 15). There are Shallow Zone monitor wells that are located to the west, south, and east where uranium was either not detected or were detected at a concentration less than its MCL.

Contaminant Movement

Based on the discussion above, the number and distribution of monitor wells is considered sufficient to identify changes in the nature of contaminant migration for the predominant contaminants in the study area. If contaminant migration to the east or west were to occur, this condition would be identified by changes in concentrations in samples from monitor wells located along the eastern or western margins of the study area.

To date, the monitoring program has identified and continues to monitor perchlorate that has entered the study area from both the east and west from off-site sources (Figure 16).

Monitor wells are also located along Lake Mead Parkway south and upgradient of the study area. These monitor wells can be used to identify any potential dissolved phase compounds or constituents migrating into the study area.

Groundwater Movement

A review of the water level figure prepared with the 2010 monitoring data indicates that the number and distribution of monitor wells is similarly sufficient to characterize water level conditions in the study area (Figure 5). The area of water level monitoring includes the former facilities areas and ancillary investigation areas, all present and former process ponds and other surface water bodies, the GWTS, and the downgradient area.

A review of all historic water level data for this same area indicates that the direction of Shallow Zone groundwater movement has been consistently to the north and northeast. There have not been any instances where shallow groundwater movement has apparently been impacted by surface ponds or groundwater withdrawal or injection with the exception of the operation of the Companies' GWTS. Coupled with the water level data measured quarterly in the GWTS area, the program as comprised is sufficient to monitor groundwater movement in the study area.

Summary

The evaluation of the monitoring program indicate that the program is adequate based on these metrics for the Shallow Zone. There are no apparent data gaps identified for the Shallow Zone; however the evaluation did identify two issues of uncertainty regarding water quality:

- VOC concentrations north of the GWTS in the downgradient area, and
- The eastern extent of chloroform.

VOCs in the downgradient area, that are attributable to the former facilities, are anticipated to be remediated through the continuing improvements to the Companies' GWTS. However, it should be noted that the concentrations of some VOCs in the downgradient area may be from off-site sources. The eastern extent of chloroform can be defined with data from the Tronox and Timet facilities supplementing those data collected by the Companies.

The data suggest the elevated concentrations of chloroform to the east of the Companies' site, not including concentrations found in monitor well M-125, are not attributable to source areas at

the former Montrose and Stauffer facilities. The Companies do not intend to continue to monitor wells in this area. However, the Companies will incorporate data from this area in future data submittals as it is available.

NDEP requested that the Companies expand the 2010 monitoring event to include seven additional Shallow Zone monitor wells (NDEP 2010). These monitor wells included M-064, M-083, M-098, M-099, MW-AHX, MW-A-J, and MW-R. The Companies agreed to incorporate these monitor wells in the Site-Wide program for the April 2010 monitoring event (H+A, 2010).

A review of the data from these monitor wells along with all of the data collected during the monitoring event, indicate that although these wells do increase the density of data spatially at the site, data from these wells are not needed to gain further understanding of study area conditions or develop or confirm conclusions in the program for the future monitoring events. Most of these monitor wells were located along the margins of the study area, where other nearby wells provided water level coverage and/or were sampled and indicated compounds and constituents as either non-detect or less than MCLs. Monitor well M-098 was dry. Therefore the Companies do not plan to incorporate these monitor wells into the 2011 monitoring plan. The scope of the 2011 Site-Wide monitoring plan will be submitted to NDEP under separate cover (Section 4.4.1).

3.2 MIDDLE ZONE

Groundwater in the upper portions of the UMCf, where overlain by saturated Qal and/or xMC typically occurs under semi-confined to confined conditions and is referred to as the Middl Zone hydrogeologic unit. Portions of the UMCf identified as Middle Zone are typically fin grained. Locations of the Middle Zone monitor wells utilized in this evaluation are shown Figure 19, while specific monitor well details are presented in Table 5.

3.2.1 Depth to Groundwater and Elevations

In the second quarter 2010 depths to water in the Middle Zone ranged from 21.77 feet bgs monitor well TR-02 to 53.69 feet bgs at monitor well MC-MW-10. These depths to water a consistent with previous monitoring events.

Groundwater elevations in the Middle Zone were highest near the Montrose Closed Ponds decreasing in elevation to the north. Groundwater elevations ranged from approximately 1,792 feet msl at monitor well CP-1 to approximately 1,687 feet msl at monitor well MC-MW-29 (Table 6). These conditions are similar to that reported for 2009 (H+A, 2010g). Field forms used during water level measurements and NAPL gauging are included in Appendix B.

3.2.2 Vertical Head Differences

Groundwater occurs in the UMCf under confined or semi-confined conditions. Groundwater levels rise in monitor wells completed in the Middle Zone to levels above the top of the UMCf (H+A, 2009b).

In most locations (Figure 20), groundwater elevations determined at monitor wells completed in the Middle Zone are approximately 0 to 13 feet higher in elevation compared to groundwater elevations at nearby Shallow Zone monitor wells (Table 7 and Figure 21). This indicates that an upward vertical gradient exists between the UMCf and the Shallow Zone.

Consideration of variable groundwater densities and subsequent groundwater elevation corrections has a small effect on the observed upward vertical gradient (H+A, 2009b). However, groundwater elevation corrections due to density considerations can change the magnitude of groundwater gradients which can result in a reversal of gradient direction when gradients are very small, such as at well cluster 2. Groundwater elevations measured from monitor wells completed in the Deep Zone are greater than both groundwater elevations measured from Middle and Shallow Zone monitor wells (Table 7 and Figure 21). This indicates an upward vertical hydraulic groundwater gradient between the Deep Zone and the overlying Middle and Shallow Zones. These data also suggest that the upper portions of the UMCf act as a confining unit (or aquitard) between the Deep and Shallow Zones.

3.2.3 Groundwater Gradient and Flow Directions

Similar to Shallow Zone groundwater, the overall slope of the Middle Zone potentiometric surface is similar in nature to the slope of the land surface in the study area. Groundwater measurements taken in the second quarter 2010 monitoring event from Middle Zone monitor wells suggest a general groundwater flow of north through the study area (Figure 22). The hydraulic gradient in the Middle Zone typically ranges from approximately 0.02 ft/ft to 0.03 ft/ft.

3.2.4 Middle Zone Chemical Concentrations and Distribution

Groundwater samples were collected from 27 Middle Zone monitor wells located in or near the study area, including two BRC CAMU area monitor wells, during the second quarter 2010 event.

Based on the comprehensive laboratory analytical program for analysis of groundwater samples collected during the 2010 Site-Wide investigation, the analytical data were evaluated to develop a list of representative chemical compounds in Middle Zone groundwater to be discussed in detail to illustrate the extent of chemical compounds in the study area. Factors that were used in developing this list included prevalence of the chemical, relative toxicity, and a review of the physical/chemical properties of the compound. Table 8 presents the prevalence of compounds detected in the Middle Zone. The prevalence table shows compounds that satisfy the following criteria:

- An agency guidance level (MCL or BCL) is established for the compound and
- A concentration that exceeded one of the guidance levels (BCL or MCL) was detected in at least one of the samples taken in the second quarter 2010.

The remaining compounds were then reviewed for their prevalence at concentrations above their MCLs or BCLs and their relative toxicity. A review of the physical/chemical properties of the remaining compounds including density, vapor pressure, solubility, Henry's Law constant, and the octanol/water partition coefficient was then completed (see Tables 4-8 and 4-8a in the CSM, H+A, 2008). The identified compounds resulting from this evaluation are discussed in detail below.

Consistent with the information presented in the CSM (H+A, 2008), contaminant concentrations in Middle Zone groundwater are highest beneath source areas in the former facilities areas and decrease significantly to the north in the area of the GWTS (Figures 23 through 34).

3.2.4.1 Volatile Organic Compounds

In 2010, concentrations of 13 different VOCs greater than their respective MCLs were detected in groundwater samples from Middle Zone monitor wells located immediately north of the Montrose Closed Ponds, continuing north into the area of the former Montrose, Stauffer, and current Olin facilities, and near the GWTS. The distribution of VOCs is consistent to that defined in the CSM and reported for 2009 (H+A, 2008 and 2010g).

Within the study area, concentrations of the prevalent VOCs, benzene, chlorobenzene, chloroform, 1,2-DCB, and 1,4-DCB were consistently detected above their MCLs (Table 8) and varied at each individual monitor well during the period of record. However, the concentrations of these VOCs measured in 2010 are consistent with previous findings. Figures illustrating the distribution of benzene, chlorobenzene, and chloroform, 1,2-DCB, and 1,4-DCB have been prepared to denote chemical character and distribution throughout the Site (Figures 23 through 27).

Benzene

The distribution of benzene in Middle Zone groundwater in the study area is shown on Figure 23. Benzene was detected above laboratory detection limits in 22 of the 27 groundwater analyses from the Middle Zone in 2010 (approximately 81 percent) (Table 8). Detectable benzene concentrations in Middle Zone groundwater ranged from 0.2 to 140,000 µg/l. The maximum benzene concentration was detected in Middle Zone monitor well MC-MW-10 north of the Montrose Former Plant Site. Benzene was detected in 12 groundwater samples at concentrations above the MCL for benzene of 5 µg/l (approximately 44 percent of the total number of samples).

Benzene was detected in varying concentrations across the study area in the Middle Zone. Benzene was not detected in southern Middle Zone monitor well CP-01. Benzene was detected at low concentrations in the western portion of the study area except at monitor well EC-13, which had a benzene concentration of 240 µg/l (Figure 23). Benzene was detected above the MCL in all three Middle Zone monitor wells near the GWTS. Benzene concentrations on the western side of the Tronox facility ranged from less than 2.0 µg/l (TR-02, TR-04) to 34,000 µg/l (MC-MW-18). The highest detection of benzene in the Middle Zone underlying the Tronox facilities was 0.96 µg/l.

Concentrations of benzene in the Middle Zone are well defined to the south, west, and east of the Site (Figure 23). To address Middle Zone chemical concentrations near and downgradient of the GWTS a work plan has been submitted and approved by NDEP (H+A, 2010d) which includes the installation of seven additional Middle Zone monitor wells in the area of the GWTS.

Chlorobenzene

The distribution of chlorobenzene in Middle Zone groundwater in the study area is shown on Figure 24.

Chlorobenzene was detected above laboratory detection limits in 24 of the 27 groundwater analyses from the Middle Zone in 2010 (approximately 89 percent) (Table 8). Detectable chlorobenzene concentrations in Middle Zone groundwater ranged from 1.2 to 410,000 µg/l. The maximum chlorobenzene concentration was detected in Middle Zone monitor well MC-MW-12 northeast of the Montrose Former Plant Site near the property boundary between Olin and Tronox. Chlorobenzene was detected in 12 groundwater samples at concentrations above the MCL for chlorobenzene of 100 µg/l (approximately 44 percent of the total number of samples).

Chlorobenzene was commonly detected in the Middle Zone at concentrations above its MCL throughout the Olin property including the former Montrose facility. A chlorobenzene concentration of 1.2 µg/l was detected in southern Middle Zone monitor well CP-01. Chlorobenzene was detected at low concentrations in the western portion of the study area except at monitor well EC-13 which had a chlorobenzene concentration of 1,800 µg/l (Figure 24). Chlorobenzene was detected above its MCL at all three Middle Zone monitor wells near the GWTS. Chlorobenzene concentrations on the western side of the Tronox facility ranged from less than 2.0 µg/l (TR-02, TR-04) to 250,000 µg/l (MC-MW-18).The highest detection of chlorobenzene in the Middle Zone underlying the Tronox facilities was 4.5 µg/l.

Concentrations of chlorobenzene in the Middle Zone are well defined to the south, west, and east of the Site (Figure 24). To address Middle Zone chemical concentrations near and downgradient of the GWTS a work plan has been submitted and approved by NDEP (H+A 2010d) which includes the installation of seven additional Middle Zone monitor wells in the area of the GWTS.

Chloroform

The distribution of chloroform in Middle Zone groundwater in the study area is shown on Figur 25. Chloroform was detected above laboratory detection limits in 20 of the 27 groundwate analyses from the Middle Zone in 2010 (approximately 74 percent) (Table 8). Detectabl chloroform concentrations in Middle Zone groundwater ranged from 0.42 to 69,000 µg/l. Th maximum chloroform concentration was detected Middle Zone monitor well MC-MW-10 north the Montrose Former Plant Site.

The maximum concentration of chloroform is greater than the MCL for total trihalomethanes (which includes chloroform) of 80 µg/l. Chloroform was detected in eight samples above the MCL (approximately 30 percent of the total number of samples).

Chloroform was detected in the Middle Zone at concentrations above its MCL throughout and in the northern portion of the study area. Chloroform was not detected in southern Middle Zone monitor well CP-01, and was not detected above its MCL in the western portion of the study area (Figure 25). Chloroform was not detected above its MCL near the GWTS. Chloroform concentrations on the western side of the Tronox facility ranged from less than 2.0 µg/l (TR-02) to 24,000 µg/l (MC-MW-18). The highest detection of chloroform in the Middle Zone underlying the Tronox facilities was 43 µg/l.

Concentrations of chloroform below the MCL in the Middle Zone are well defined and are defined to the south, west, and east of the Site for concentrations below the BCL (Figure 25). To address Middle Zone chemical concentrations near and downgradient of the GWTS a work plan has been submitted and approved by NDEP (H+A, 2010d) which includes the installation of seven additional Middle Zone monitor wells in the area of the GWTS.

1,2-Dichlorobenzene

The distribution of 1,2-DCB in Middle Zone groundwater in the study area is shown on Figure 26. 1,2-DCB was detected above laboratory detection limits in 23 of the 36 groundwater analyses from the Middle Zone in 2010 (approximately 64 percent) (Table 8). Detectable 1,2-DCB concentrations in Middle Zone groundwater ranged from 0.43 to 13,000 µg/l. The maximum 1,2-DCB concentration was detected in Middle Zone monitor well MC-MW-12 northeast of the Montrose Former Plant Site near the property boundary between Olin and Tronox. The maximum concentration of 1,2-DCB is greater than the MCL of 600 µg/l. 1,2-DCB was detected in seven samples above the MCL (approximately 19 percent of the total number of analyses).

1,2-DCB was detected in Middle Zone groundwater above its MCL throughout and northeast of the former Montrose facility. 1,2-DCB was detected below its MCL in the southern most Middle Zone monitor well, CP-01, and was not detected above its MCL in the western portion of the study area (Figure 26). 1,2-DCB was detected below its MCL at the three Middle Zone monitor wells near the GWTS.

1,2-DCB concentrations on the western side of the Tronox facility ranged from less than 2.0 µg/l (TR-02 and TR-04) to 7,500 µg/l (MC-MW-18). The highest detection of 1,2-DCB in the Middle Zone underlying the Tronox facilities was 0.67 µg/l.

Concentrations of 1,2-DCB in the Middle Zone are well defined to the south, west, east and north of the Site (Figure 26).

1,4-Dichlorobenzene

The distribution of 1,4-DCB in Middle Zone groundwater in the study area is shown on Figure 27. 1,4-DCB was detected above laboratory detection limits in 23 of the 36 groundwater analyses from the Middle Zone in 2010 (approximately 64 percent) (Table 8). Detectable 1,4-DCB concentrations in Middle Zone groundwater ranged from 0.48 to 30,000 µg/l.

The maximum 1,4-DCB concentration was detected in Middle Zone monitor well MC-MW-12, northeast of the Montrose Former Plant Site near the property boundary between Olin and Tronox. The maximum concentration of 1,4-DCB is greater than the MCL of 75 µg/l. 1,4-DCB was detected in 13 samples above the MCL (approximately 36 percent of the total number of analyses).

1,4-DCB was detected in Middle Zone groundwater above its MCL throughout and northeast of the former Montrose facility and at all three Middle Zone monitor wells near the GWTS. 1,4-DCB was not detected above its MCL in southern Middle Zone monitor well CP-01, and was not detected above its MCL in the western portion of the study area (Figure 27). 1,4-DCB concentrations on the western side of the Tronox facility ranged from less than 2.0 µg/l (TR-02 and TR-04) to 13,000 µg/l (MC-MW-18). The highest detection of 1,4-DCB in the Middle Zone underlying the Tronox facilities was 0.69 µg/l.

Concentrations of 1,4-DCB in the Middle Zone are well defined to the south, west, and east of the Site (Figure 27). To address Middle Zone chemical concentrations near and downgradient of the GWTS a work plan has been submitted and approved by NDEP (H+A, 2010d) which includes the installation of seven additional Middle Zone monitor wells in the area of the GWTS.

3.2.4.2 Pesticides

In 2010, concentrations of five different pesticides greater than their respective BCLs and two pesticides (gamma BHC and heptachlor epoxide) greater than its MCL were detected in groundwater samples from Middle Zone monitor wells (Table 8). BHC isomers (i.e., alpha-, beta-, and gamma-) account for three of the five pesticide compounds detected and 49 of 56 (approximately 88%) of all pesticide detections. The distribution of BHC isomers in groundwater is described below. Maps depicting the distribution of alpha-, beta-, and gamma-BHC are included as Figures 28 through 30.

Alpha-BHC

The distribution of alpha-BHC in Shallow Zone groundwater in the study area is shown on Figure 28. Alpha-BHC was detected above laboratory detection limits in 23 of the 27 analyses from the Middle Zone groundwater in 2010 (85 percent). Detectable alpha-BHC concentrations ranged from 0.003 µg/l to 25 µg/l. The maximum alpha-BHC concentration was detected at Middle Zone monitor well MC-MW-11 north of the former Stauffer ACD Plant Site. Alpha-BHC was detected in 17 samples at concentrations above the BCL for beta-BHC of 0.0107 µg/l (approximately 63 percent of the total number of samples).

Alpha-BHC was detected in Middle Zone groundwater above its BCL throughout and northeast of the former Montrose facility and at all three Middle Zone monitor wells near the GWTS. Alpha-BHC was detected at concentrations greater than its BCL in southern Middle Zone monitor well CP-01, but was not detected at concentrations greater than its BCL in the western most portion of the study area (Figure 28). Alpha-BHC concentrations to the east of the Site ranged from less than 0.0047 µg/l (TR-02 and TR-04) to 1.2 µg/l (MC-MW-18).

Concentrations of alpha-BHC in the Middle Zone are well defined to the west and east of the Site (Figure 28). To address Middle Zone chemical concentrations near and downgradient of the GWTS a work plan has been submitted and approved by NDEP (H+A, 2010d) which includes the installation of seven additional Middle Zone monitor wells in the area of the GWTS.

Beta-BHC

The distribution of beta-BHC in Shallow Zone groundwater in the study area is shown on Figure 29. Beta-BHC was detected above laboratory detection limits in 14 of the 27 analyses from the Middle Zone groundwater in 2010 (52 percent).

Detectable beta-BHC concentrations ranged from 0.004 µg/l to 10 µg/l. The maximum beta-BHC concentration was detected at Middle Zone monitor well MC-MW-11 north of the former Stauffer ACD Plant Site. Beta-BHC was detected in 9 samples at concentrations above the BCL for beta-BHC of 0.0374 µg/l (approximately 33 percent of the total number of samples).

Beta-BHC was detected in Middle Zone groundwater above its BCL throughout and northeast of the former Montrose facility and at one Middle Zone monitor well near the GWTS (MC-MW-30). Beta-BHC was detected at concentrations greater than its BCL in southern Middle Zone monitor well CP-01, but was not detected at concentrations greater than its BCL in the western most portion of the study area (Figure 29). With the exception of the detections of 0.35 µg/l (well MC-MW-18) and 0.058 µg/l (well MC-MW-17), beta-BHC to the east of the Site was either not detected above detection limits or detected at a concentration less than the BCL of 0.0374 µg/l.

Concentrations of beta-BHC in the Middle Zone are well defined to the west and east of the Site (Figure 29). To address Middle Zone chemical concentrations near and downgradient of the GWTS a work plan has been submitted and approved by NDEP (H+A, 2010d) which includes the installation of seven additional Middle Zone monitor wells in the area of the GWTS.

Gamma-BHC

The distribution of gamma-BHC in Shallow Zone groundwater in the study area is shown on Figure 30. Gamma-BHC was detected above laboratory detection limits in 12 of the 27 analyses from the Middle Zone groundwater in 2010 (44 percent). Detectable gamma-BHC concentrations ranged from 0.032 µg/l to 11 µg/l. The maximum gamma-BHC concentration was detected at Middle Zone monitor well MC-MW-11 north of the former Stauffer ACD Plant Site. Gamma-BHC was detected in 7 samples at concentrations above the MCL and BCL for gamma-BHC of 0.2 µg/l (approximately 26 percent of the total number of samples).

Gamma-BHC was detected in Middle Zone groundwater above its MCL throughout and northeast of the former Montrose facility. Gamma-BHC was not detected at concentrations greater than its MCL in southern Middle Zone monitor well CP-01 or in the western most portion of the study area (Figure 30). With the exception of a detection of 0.34 µg/l at well MC-MW-1 gamma-BHC to the east of the Site was either not detected above detection limits or detected concentrations less than the MCL of 0.2 µg/l.

Concentrations of gamma-BHC in the Middle Zone are well defined to the south, west, east and north of the Site (Figure 30).

Other Pesticides

4,4-dichlorodiphenyldichloroethane (4,4-DDD), 4,4-DDE, 4,4-DDT, were detected at concentrations greater than their respective BCLs and heptachlor epoxide greater than its MCL in 2010 groundwater samples from Middle Zone monitor wells (Table 8). 4,4-DDD was detected at concentrations greater than its BCL (0.28 µg/l) in one Middle Zone sample (MC-MW-12). 4,4-DDT was detected at concentrations greater than its BCL (0.198 µg/l) in two Middle Zone samples (Mw-MW-12 and -18). 4,4-DDE was detected at concentrations detected greater than its BCL (0.198 µg/l) in two Middle Zone samples (MC-MW-12 and -18). Heptachlor epoxide aws detected at concentrations greater than its MCL (0.2 µg/l) in one sample (MC-MW-12) (Table 8).

3.2.4.3 Metals

In 2010, concentrations of four metals (arsenic, cadmium, chromium, and uranium) greater than their respective MCLs were detected in groundwater samples from Middle Zone monitor wells. Arsenic and uranium make up the majority of metal detections accounting for 50 of the 74 (approximately 68%) of all metal detections. For the purposes of this evaluation, the distributions of arsenic and uranium detected in groundwater samples were evaluated (Figures 31 and 32). Arsenic and uranium were detected in 96 percent of the analyses in 2010 (Table 8).

Arsenic

Arsenic is a naturally occurring metal in Middle Zone groundwater in the study area. The distribution of arsenic in Middle Zone groundwater is shown in Figure 31. Arsenic was detected above laboratory detection limits in 100 percent of the groundwater analyses from the Middle Zone in 2010 (Table 8). Detectable arsenic concentrations in Middle Zone groundwater ranged from 6.4 to 310 µg/l, as compared to the MCL of 10 µg/l. The maximum arsenic concentration was detected in Middle Zone monitor well MC-MW-10 located north of the Montrose Former Plant Site. Arsenic was detected in 25 samples above the MCL (approximately 93 percent of the total number of samples).

Arsenic was detected above the MCL in every Middle Zone monitor well except MC-MW-12 and MC-MW-18 (Figure 31). Concentrations of arsenic in groundwater samples collected from monitor wells near the GWTS ranged from 19 to 24 µg/l. Groundwater samples collected from Tronox area monitor wells indicated arsenic concentrations ranging from 6.7 – 37 µg/l.

Concentrations of arsenic below the MCL in the Middle Zone are not well near the Site for (Figure 31).

Uranium

Uranium is a naturally occurring metal in Middle Zone groundwater in the study area. The distribution of uranium in Middle Zone groundwater is shown in Figure 32. Uranium was detected above laboratory detection limits in 85 percent of the groundwater analyses from the Middle Zone in 2010 (Table 8). Detectable uranium concentrations in Middle Zone groundwater ranged from 0.92 to 160 µg/l. The maximum uranium concentration was detected in Middle Zone monitor well MC-MW-17 located northeast of the Montrose Former Plant Site near the property boundary between Olin and Tronox.

The maximum concentration is greater than the MCL for uranium of 30 µg/l. Uranium was detected in four samples above the MCL (approximately 15 percent of the total number of samples).

Concentrations of uranium in groundwater samples collected from Middle Zone monitor wells near the GWTS ranged from 6.1 to 83 µg/l. Uranium was not detected at concentrations greater than its MCL in the western or southern portions of the study area. Concentrations of uranium were detected above its MCL in one monitor well near the GWTS (MC-MW-29). Uranium concentrations on the western side of the Tronox facility ranged from less than 2.6 µg/l (TR-02 and TR-04) to 160 µg/l (MC-MW-17). The highest detection of chloroform in the Middle Zone underlying the Tronox facilities was 6.6 µg/l.

Concentrations of uranium below the MCL in the Middle Zone are well defined to the south, east and west of the Site (Figure 32). To address Middle Zone chemical concentrations near and downgradient of the GWTS a work plan has been submitted and approved by NDEP (H+A 2010d) which includes the installation of seven additional Middle Zone monitor wells in the area of the GWTS.

Other Metals

Cadmium and were detected at concentrations greater than their respective MCLs in 2010 Site-Wide groundwater samples from Middle Zone monitor wells (Table 8). Cadmium was detected at concentrations greater than its MCL of 0.005 µg/l in one sample (4 percent of analyses) and chromium was detected at concentrations greater than it's MCL of 0.1 µg/l in one sample (4 percent of analyses).

3.2.4.4 Other Inorganic Constituents

Concentrations of three other inorganic constituents greater than their BCLs, two greater than their MCL, and TDS were detected in Site-Wide groundwater samples from Middle Zone monitor wells located immediately north of the Montrose Closed Ponds, extending north into the area of the former Montrose, Stauffer, and current Olin facilities. Concentrations of TDS and perchlorate greater than its BCL were also detected in groundwater samples near the GWTS (Table 8). Perchlorate and TDS make up the majority of inorganic detections accounting for 49 of the 100 detections in 2010 (approximately 49 percent). For the purposes of this evaluation, the distributions of perchlorate and TDS detected in groundwater samples were evaluated (Figures 33 and 34).

Perchlorate

The distribution of perchlorate in Middle Zone groundwater is shown in Figure 33. Perchlorate was detected above laboratory detection limits in 24 of the 27 groundwater analyses from the Middle Zone in 2010 (approximately 89 percent) (Table 8). Detectable perchlorate concentrations in Middle Zone groundwater ranged from 0.12 to 250,000 µg/l. The maximum perchlorate concentration was detected in Middle Zone monitor well M-149 located on the east side of the Tronox facility.

The maximum concentration is greater than the BCL for perchlorate of 18 µg/l. Perchlorate was detected in six monitor wells above the BCL (approximately 22 percent of the total number of samples) and three samples in Tronox sampled wells. Perchlorate was not detected in Middle Zone groundwater in the former Montrose and Stauffer facilities or near the GWTS at concentrations greater than the BCL (Figure 33). All detections of Middle Zone perchlorate greater than the BCL were found east of the study area underlying the Tronox facilities.

Concentrations of perchlorate below the BCL in the Middle Zone are well defined in the study area (Figure 33).

Total Dissolved Solids

The distribution of TDS in Middle Zone groundwater is shown in Figure 34. Based on 25 analyses, detectable TDS concentrations ranged from 510 to 44,000 mg/l in the Middle Zone in 2010 (Table 8). The maximum TDS concentration in the Middle Zone was detected in monitor well MC-MW-15 located near operational brine evaporation ponds.

The highest TDS concentrations are observed in the following areas: 1) east of the Olin property near the Olin/Tronox property boundary, 2) north of the Montrose Former Plant Site, and 3) near the GWTS (Figure 34). The lowest Middle Zone TDS results (less than 1,000 mg/l) were found in the southern portions of the study area, on the western edge of the study area, near the AMPAC and EC wells , and on the eastern edge of the BRC CAMU facility (Figure 34).

3.2.4.5 Cation – Anion Analyses

In addition to the above analyses, cation-anion balances were calculated from data generated by the 2010 Site-Wide groundwater monitoring event. The results of this evaluation for the Middle Zone are shown in Table 9. The variance between cation and anion sums was calculated based on recent NDEP guidance (NDEP, 2009b). The variance between the cation and anion sums ranged between -11.0 and 19.9 percent. Four of the 24 samples used in the Middle Zone cation-anion balance calculations had a variance greater than the acceptable ±5 percent range (Table 9). These samples were collected from EC-14, M-149, MC-MW-17, and MC-MW-31. It is important to note that balance results may be influenced by dilution requirements, matrix interference, and elevated sample results.

In addition, TDS checks were evaluated by comparing the measured laboratory TDS to calculated TDS (NDEP, 2009b). 16 of 25 groundwater samples were within the acceptable ratios of 1.0 – 1.2 (Table 9). No anion sum was greater than 800 meq/l and thus no charge balance error checks were performed (NDEP, 2009b).

3.2.4.6 DNAPL Observations

Current and previous EPA guidance regarding defining the existence and extent of NAPL indicate that it is best to use a "preponderance of evidence" approach.

This approach includes review of several lines of direct and indirect evidence to define the most likely areas where NAPL may exist in the subsurface.

These lines of evidence include:

- Direct visual evidence;
- Positive FLUTe Ribbon Reaction;
- PID or FID readings greater than 1,000 parts per million, and
- Percent groundwater solubility greater than 5.

Figure 35 outlines the area where the preponderance of evidence indicates that DNAPL is likely present in either residual form in the aquifer matrix or potentially pooled NAPL. The DNAPL observed in the vicinity of the former Montrose facility was encountered as a residual mass (i.e., not pooled) between 30 and 120 below ground surface in this area. The shallowest occurrences of DNAPL were observed in reconnaissance boring RB-03 (now monitor well AA-MW-14) located in the northwest portion of the Montrose Former Plant Site (H+A, 2008).

During the second quarter 2010, DNAPL was observed in Middle Zone monitor wells MC-MW-11, MC-MW-12, and MC-MW-18. Pumping equipment was specifically placed to avoid sampling DNAPL while collecting the groundwater samples from these monitor wells (Appendix B). Because DNAPL had been observed in these three well previously, DNAPL samples were not collected. However, BRC did collect a DNAPL sample from MC-MW-12 during their monitoring event. For the full analytical results of the second quarter 2010 samples see Appendix D.

3.2.4.7 Field Parameters

Dissolved oxygen, oxidation-reduction potential, and pH are parameters in groundwater that can help further determine bacterial metabolisms of dissolved organic species as wells as the valence state of trace metals in groundwater. As part of the field sampling SOPs (H+A, 2007), these parameters were monitored in the field while the pre – sampling well purge took place (Appendix B). Figure 36 show the distribution of the parameters in Middle Zone groundwater. pH in Shallow Zone groundwater ranged from 6.78 (CP-01) to 8.20 (DPT-01), dissolved oxygen ranged from 0.00 mg/l in a majority of the monitor wells to 6.91 mg/l (AGX-160), and redox potential ranged from -336 mV (MC-MW-15) to 160 mV (AGX-190).

3.2.5 Evaluation of Middle Zone Monitoring

An evaluation of the adequacy of the Middle Zone monitoring program was also conducted t determine if the program provides sufficient data to monitor the groundwater contamination i the study area. The metrics used for the Middle Zone were the same as for the Shallow Zon (Section 3.1.4).

Contaminant Boundaries – Organic Compounds

A review of the water quality figures prepared with the 2010 monitoring data indicated that th number and distribution of monitor wells was sufficient to identify the area and boundarie where most of the predominant contaminants are present at concentrations greater than the respective MCLs (Figures 23 through 30). There are a sufficient number of monitor wells tha are located along the western, southern, and eastern portions of the study area where th predominant VOCs and gamma-BHC were either not detected or were detected concentrations less than their respective MCLs,

However, benzene, chlorobenzene, 1,4-DCB were detected in groundwater samples at monit wells located immediately downgradient of the GWTS at concentrations greater than the respective MCLs. As previously noted, the Companies are presently in the process investigating this area including the installation of several wells into the UMCf at a downgradient of the GWTS.

Additionally, DNAPL was observed in monitor well MC-MW-18 in 2009. Monitor well MC-MW 18 is located northeast of the former facilities areas, on Tronox property and was t northeastern-most Middle Zone DNAPL reconnaissance boring/monitor well drilled as part of t DNAPL investigation. Subsequent interface probe measurements indicate that DNAPL present at MC-MW-18. Montrose has submitted a DNAPL reconnaissance work plan to NDE NDEP has approved the work plan and the investigation, including the installation of additio Middle Zone monitor wells in the area of MC-MW-18 will commence as soon as property acce issues are resolved.

Contaminant Boundaries – Inorganic Constituents

Water quality figures for the inorganic constituents arsenic, uranium, perchlorate, and TDS w also reviewed as part of this evaluation.

Only arsenic and uranium have MCLs. Similar to conditions in the Shallow Zone, arsenic is a naturally occurring constituent in groundwater and is routinely detected in Middle Zone samples collected throughout the study area. Based on this condition, identifying the MCL boundary for arsenic is not practicable for the study area. However, as with the Shallow Zone, the Middle Zone monitoring program is sufficient to define where arsenic is most elevated in the study area; that area extending from the former facilities area in the south to the GWTS area in the north (Figure 31).

Uranium is also a naturally occurring constituent in groundwater and is detected in groundwater samples collected throughout most of the study area. A review of the 2010 monitoring event data indicated that the number and distribution of monitor wells was sufficient to determine the boundary for uranium greater than its MCL with the exception of immediately north of the GWTS (Figure 32). There are Middle Zone monitor wells that are located to the west, south, and east where uranium was either not detected or were detected at a concentration less than its MCL.

Contaminant Movement

Based on the evaluation above, the number and distribution of monitor wells is considered sufficient to identify changes in the nature of contaminant migration for the predominant contaminants in the study area. Similar to the Shallow Zone; if contaminant migration to the east or west were to occur, this condition would be identified by changes in concentrations in samples from monitor wells located along the eastern or western margins of the study area.

Groundwater Movement

A review of the water level figure prepared with the 2010 monitoring data indicates that the number and distribution of monitor wells is sufficient to characterize water level conditions (Figure 22).

The area of water level monitoring includes all of the former facilities areas and ancillary investigation areas, all present and former process ponds and other surface water bodies, and the GWTS area. A review of previous water level data for the study area indicates that the direction of Middle Zone groundwater movement is to the north.

There have not been any instances to date where Middle Zone groundwater movement ha apparently been impacted by any study area processes. The impact of the GWTS on th Middle Zone will be evaluated as part of the investigation presently being conducted by th Companies.

Summary

The evaluation of the monitoring program indicate that the program is mostly adequate base on these metrics for the Middle Zone. However, this evaluation, the overall review of the 201 dataset, and discussions with NDEP has identified two data gaps in the Middle Zone;

- Extent of DNAPL material to the northeast of the former facilities area, and
- The extent of dissolved VOCs in the area north of the GWTS.

The Companies have submitted work plans to address both of these issues. Once proper access is secured, the investigations outlined in these work plans will commence.

NDEP requested that the Companies expand the 2010 monitoring event to include eleve additional Middle Zone monitor wells (NDEP 2010). These monitor wells included well AGX-90, AGX-160, AGX-190, TR-2, TR-4, M-136, M-149, M-150, M-151, M-153, and MC MW-15. The Companies agreed to incorporate these monitor wells in the Site-Wide program fo the April 2010 monitoring event only (H+A, 2010).

A review of the data from these monitor wells along with all of the data collected during th monitoring event, indicate that a number of these monitor wells were located along the margin of the study area, where in most cases other nearby wells provided water level coverage and/o were sampled and indicated compounds and constituents as either non-detect or less tha MCLs:

- Monitor wells AGX-90, AGX-160, and AGX-190 are located well to the west of the are were organic compounds are greater than their respective MCLs. Monitor wells MCP BW-11A, EC-14, and EC-12 provide locations where the western extent o contamination can be defined,

- Monitor wells M-136, M-149, M-150, M-151, and M-153 are located to the east of the area were most organic compounds are greater than their respective MCLs. Monitor wells installed as part of Montrose's DNAPL investigation (H+A, 2010e) are anticipated to delineate the eastern extent of both DNAPL materials as well as dissolved phase organic compounds to the east.

Monitor well MC-MW-15 is useful in providing a water level and water quality data point downgradient of the former facilities area. A review of the 2010 water quality data indicate that organic compounds are lower at monitor well MC-MW-15 compared to those in the former facilities area; indicating that potential source areas to the Middle Zone do not extent to the area of MC-MW-15 and that concentrations are decreasing at distance away from the potential source areas.

Therefore, the Companies recommend retaining monitor well MC-MW-15 in the monitoring program but do not plan to incorporate any of the other monitor wells into the 2011 monitoring plan. However, as a contingency, the Companies will incorporate monitor wells TR-02 and TR-04 into the program if the monitor wells installed as part of the Montrose DNAPL investigation indicate concentrations of organic compounds greater than MCLs, or if access to the Tronox property has not been achieved by the time of the 2011 monitoring event.

3.3 DEEP ZONE

Groundwater present in the deeper, slightly coarser-grained portions of the UMCf (generally greater than 200 feet below land surface) is referred to as the Deep Zone. Deep Zone groundwater is encountered under confined conditions. Locations of the Deep Zone monitor wells utilized in this evaluation are shown in Figure 37, while specific monitor well details are presented in Table 10.

3.3.1 Depth to Groundwater and Elevations

In the second quarter 2010 depths to water in the Deep Zone ranged from 41.68 feet above ground surface at monitor well DMC-MW-28 to 8.90 feet bgs at monitor well DMC-MW-27. These heads/depths to water are consistent with previous monitoring events.

Groundwater elevations in the Deep Zone were highest near the Montrose Closed Ponds Area, decreasing in elevation to the north.

Groundwater elevations ranged from approximately 1,816 feet msl at monitor well DMC-MW to approximately 1,726 feet msl at monitor well TR-12 (Table 11). As stated above in sec 3.2.2 there is a large head difference between groundwater encountered in the Deep Zone groundwater encountered in the shallow and Middle Zones. These conditions are similar to reported for 2009 (H+A, 2010g). Field forms used during water level measurements and NA gauging are included in Appendix B.

3.3.2 Groundwater Gradient and Flow Directions

Groundwater encountered in the Deep Zone is generally under confined conditions. Simila Shallow Zone groundwater, the overall slope of the Deep Zone potentiometric surface is sim in nature to the slope of the land surface in the study area. Groundwater measurements ta in the second quarter 2010 monitoring event from Deep Zone monitor wells suggest a gen groundwater flow of north through the study area (Figure 38). A review of water level data f the Deep Zone monitor wells indicates that the groundwater gradient in the Deep Zon typically 0.01 ft/ft and more uniform than the overlying units.

3.3.3 Deep Zone Chemical Concentrations and Distribution

Groundwater samples were collected from 11 Deep Zone monitor wells located in or near study area during the second quarter 2010 event. The following sections provide a discussion of compounds and constituents present in Deep Zone groundwater. Table presents the prevalence of compounds detected in the Shallow Zone. The prevalence t shows compounds that satisfy the following criteria:

- An agency guidance levels (MCL or BCL) is established for the compound and
- A concentration that exceeded one of the guidance levels (BCL or MCL) was detecte at least one of the samples taken in the second quarter 2010.

Volatile Organic Compounds

Concentrations of VOCs in Deep Zone wells were, if detected, below their respective MCL all samples except for monitor well DMC-MW-27. Concentrations of 1,4-DCB chlorobenzene were detected in the groundwater sample from monitor well DMC-MW-2 concentrations greater than their respective MCLs.

Concentrations of these VOCs at monitor well DMC-MW-27 are declining compared to concentrations detected in 2009. The Companies will continue to monitor water quality conditions at well DMC-MW-27 to help to determine if these chemicals were introduced to the well during the drilling process and are dissipating over time, or if the chemicals are present in Deep Zone groundwater in this area.

Metals

Metals accounted for approximately 30 percent of all detections above MCLs or BCLs in the Deep Zone monitor wells (Table 12). Arsenic was the most prevalent analyte detected in Deep Zone groundwater with 100 percent (11) of its detections above its MCL of 10 µg/l. Arsenic concentrations ranged from 26 to 270 µg/l and were present throughout the study area.

3.3.3.1 Cation – Anion Analyses

In addition to the above analyses, the laboratory also performed tests for cation-anion balances on data generated from the 2010 Deep Zone groundwater monitoring event. The results of this evaluation are presented in Table 13. The variance between cation and anion sums was calculated based on recent NDEP guidance (NDEP, 2009b). The variance between the cation and anion sums in the 11 Deep Zone samples ranged between -6.2 and 3.2 percent. Two of the 11 samples used in the Deep Zone cation-anion balance calculations had a variance greater than the acceptable ± 5 percent range (Table 13). These samples were collected from DMC-MW-27 and TR-07. It is important to note that balance results may be influenced by dilution requirements, matrix interference, and elevated sample results.

In addition, TDS checks were evaluated by comparing the measured laboratory TDS to calculated TDS (NDEP, 2009b). All TDS collected from Deep Zone groundwater were within the acceptable ratios of 1.0 – 1.2 (Table 13). No anion sum was greater than 800 meq/l and thus no charge balance error checks were performed (NDEP, 2009b).

3.3.3.2 Field Parameters

Dissolved oxygen, oxidation-reduction potential, and pH are parameters in groundwater that can help further determine bacterial metabolisms of dissolved organic species as wells as the valence state of trace metals in groundwater. As part of the field sampling SOPs (H+A, 2007), these parameters were monitored in the field while the pre – sampling well purge took place (Appendix B).

Figure 39 shows the distribution of the parameters in Deep Zone groundwater. pH in De Zone groundwater ranged from 5.43 (M-153) to 8.01 (TR-01), dissolved oxygen ranged fr 1.62 mg/l (DMC-MW-27) to 8.97 mg/l (DMC-MW-26), and redox potential ranged from 162 r (DMC-MW-27) to 249 mV at TR-05.

3.3.4 Evaluation of Deep Zone Monitoring

Deep Zone monitor wells are designed and positioned to monitor possible downward verti migration of chemical compounds from contaminated middle or Shallow Zone sources and evaluate vertical gradients in groundwater. Specific source areas are well monitored by De Zone wells for potential downward chemical migration.

An evaluation of the adequacy of the Deep Zone monitoring program was conducted determine if the program provides sufficient data to monitor the groundwater contamination the study area. The metrics used for the Deep Zone were the same as for the shallow a Middle Zones; however since the level of contamination in the Deep Zone is significantly l than either the shallow or Middle Zones, some aspects of the evaluation, such as contamin boundaries (plumes) are not applicable.

The Deep Zone monitoring program covers an extensive area from the southern portion of study area through the former facilities area and north into the GWTS area. VOCs concentrations greater than their MCLs are only present at monitor well DMC-MW-27, locate the southern portion of the study area (Figure 37).

The area where the VOC concentrations are present appear to be limited to monitor well DI MW-27 as there are no VOCs detected in groundwater samples collected from the monitor w that are located to the north and downgradient of monitor well DMC-MW-27. Arsenic naturally occurring constituent in groundwater and is present throughout the study area in Deep Zone. Defining the boundaries of arsenic in the Deep Zone is not practicable, simila the Shallow and Middle Zones.

Based on these conditions, the number and distribution of monitor wells is sufficient to ide the area and any potential movement of the VOCs greater than their MCLs are present.

4.0 SUMMARY AND CONCLUSION

This section summarizes 2010 Site-Wide monitoring data and provides a summary of groundwater conditions found in the study area. In addition, data gaps and critical uncertainties found in the review and analysis of the 2010 Site-Wide data set are summarized.

4.1 SUMMARY OF HYDROGEOLOGIC TRENDS

Groundwater elevation monitoring during the second quarter of 2010 indicates that the directions and gradients, or apparent directions and gradients, of groundwater flow in each of the three water bearing zones were consistent with previous data collected in the study area. The overall flow direction of groundwater through the study area is north – northeast. Groundwater gradients of the three water bearing zones ranged from 0.01 to 0.03 ft/ft.

Groundwater elevation data indicate an upward vertical gradient between the Shallow Zone and the underlying Deep Zone. A slight upward vertical gradient between the Shallow Zone and underlying Middle Zone is also indicated. Consideration of variable groundwater densities and subsequent groundwater elevation corrections has a very small effect on the observed upward vertical gradient. However, groundwater elevation corrections due to density considerations can change the magnitude of groundwater gradients which can result in a reversal of gradient direction when gradients are very small. Groundwater elevations measured from Deep Zone monitor wells are greater than both groundwater elevations measured from Middle and Shallow Zone monitor wells. This indicates an upward vertical hydraulic groundwater gradient between the Deep Zone and the overlying Middle and Shallow Zones. These data also suggest that the upper portions of the UMCf act as a confining unit (or aquitard) between the Deep and Shallow Zones.

4.2 SUMMARY OF CHEMICAL DISTRIBUTION

The distribution of organic and inorganic compounds was consistent with previous data collected in the study area. VOCs detected in the Shallow and Middle Zones continue to be the prevalent compounds detected above their MCLs. Results from Shallow Zone groundwater sampling show a wide distribution of VOCs from just north of the Montrose Closed Ponds Area, continuing through the Montrose Former Plant Site and BRC CAMU, and ending near the GWTS.

Concentrations of VOCs north of the GWTS are reduced compared to upgradient a indicating that VOCs are largely removed from Shallow Zone groundwater by the GW Although there were some variations in concentrations for certain analytes at certain locat during the 2010 monitoring event compared to previous monitoring events; these changes not change the understanding of study area hydrogeologic conditions.

No chemicals were identified as entering the study area, nor migrating from the study a based on the 2010 data. No significant changes were identified in the potential source ar These conditions indicate that the boundaries of the various contaminant areas are well defi and do not change significantly from monitoring event to event.

Middle Zone groundwater sampling results indicate the presence of both organic and inorga compounds. VOCs accounted for a majority of detections above guidance levels in Mi Zone groundwater in 2010. Similar to the Shallow Zone, there were some variations concentrations for certain analytes at certain locations during the 2010 monitoring ev compared to previous monitoring events; however, these changes too do not change understanding of study area hydrogeologic conditions.

Deep Zone groundwater sampling results showed little dissolved phase compound detecti with a majority being from monitor well, DMC-MW-27. The detections in DMC-MW-27 declining when compared to 2009 data. As discussed with NDEP in an October 8, 2 teleconference, the Companies will perform an extended well purge at DMC-MW-27 in fourth quarter 2010. The Companies will then continue to monitor water quality condition well DMC-MW-27 to help to determine if these chemicals were introduced to the well during drilling process and are dissipating over time, or if the chemicals are present in Deep Z groundwater in this area.

DNAPL was observed during the water level round from Middle Zone monitor well MC-MW- MC-MW-12, and MC-MW-18 during the annual 2010 monitoring round, as noted in the f observations (Appendix B). DNAPL has been observed in these wells previously and theref DNAPL samples were not collected from these wells during this sampling event. During BR second quarter 2010 monitoring round a DNAPL sample was collected from MC-MW- Montrose has submitted a DNAPL reconnaissance work plan to NDEP (H+A, 2010e) to addr the DNAPL issue.

NDEP has approved the work plan and the investigation, including the installation of additional Middle Zone monitor wells in the area of MC-MW-18 commenced on October 4, 2010.

4.3 SUMMARY OF DATA GAPS AND SOLUTIONS

Evaluations of study area data were performed to identify data gaps relevant to the assessment of hydrogeologic conditions. The following is a summary, discussed by hydrogeologic zone, of the identified data gaps. Solutions and proposed investigation to resolve the data gaps are also discussed.

4.3.1 Shallow Zone

The results of the evaluation of the monitoring program indicate that the program is adequate based on the metrics for the Shallow Zone (Section 3.1.4). There are no data gaps identified for the Shallow Zone.

4.3.2 Middle Zone

The results of the evaluation of the monitoring program indicate that the program is adequate based on the metrics for the Middle Zone (Section 3.2.5). However, this evaluation, the overall review of the 2010 dataset, and discussions with NDEP has identified two data gaps in the Middle Zone:

- Extent of DNAPL material to the northeast of the former facilities area, and
- The extent of dissolved VOCs in the area north of the GWTS.

Montrose and the Companies have submitted work plans (H+A, 2010d, and 2010e) to address both of these issues. A Middle Zone DNAPL Investigation northeast of the former facilities area began on October 4, 2010. Once property access is secured, the investigation at the GWTS outlined in thee work plan (H+A, 2010d) will commence (Section 4.4).

There are no other data gaps identified for the Middle Zone.

4.3.3 Deep Zone

The results of the evaluation of the monitoring program indicate that the program is adequate based on the metrics for the Deep Zone (Section 3.3.4). However, this evaluation, the overall review of the 2010 dataset, and discussions with NDEP has identified one data gap in the Deep Zone; the detection of VOCs at monitor well DMC-MW-27.

As discussed with NDEP in an October 8, 2010 teleconference, the Companies will perform an extended well purge at DMC-MW-27 in the fourth quarter 2010. The Companies will then continue to monitor water quality conditions at well DMC-MW-27 to help to determine if these chemicals were introduced to the well during the drilling process and are dissipating over time, or if the chemicals are present in Deep Zone groundwater in this area. There are no other data gaps identified for the Deep Zone.

4.4 PATH FORWARD

The path forward for the remainder of 2010 and the first several months of 2011 will be focused on the needs of the future groundwater RAS process.

There are essentially three tracks as follows:

- Continued routine groundwater monitoring,
- Resolve data gaps, and
- Conduct special activities in support of the groundwater RAS process.

4.4.1 Continued Routine Groundwater Monitoring

The Companies plan to continue monitoring of the extent and distribution of chemical contamination in the study area. The following sampling programs are planned for 2010 and early 2011:

- Montrose Bi-annual post-closure monitoring program (October 2010, April 2011, and October 2011);
- Annual Site-Wide monitoring program (April 2011);
- Quarterly transect and Consent Order monitoring programs (July and October 2010, January and April 2011);
- Annual GWTS extraction well monitoring program (April 2011);

The Companies will submit a 2011 Site-Wide monitoring plan to NDEP by November 5, 2010. The plan will identify the monitor wells comprising the program as well as the analytical schedule and other information. NDEP requested that the Companies expand the 2010 monitoring event to include seven additional Shallow Zone monitor wells and eleven additional Middle Zone monitor wells (NDEP 2010). The Companies agreed to incorporate these monitor wells in the Site-Wide program for the April 2010 monitoring event only (H+A, 2010).

A review of the data from these monitor wells along with all of the data collected during the monitoring event, indicate that although these wells do increase the density of data spatially at the site, data from these wells are not needed to gain further understanding of study area conditions or develop or confirm conclusions in the program for the future monitoring events. Therefore, the Companies do not plan to incorporate these monitor wells into the 2011 monitoring plan with the exception of Middle Zone monitor well MC-MW-15, and as a contingency monitor wells TR-02 and TR-04 (Section 3.2.5).

4.4.2 Resolve Data Gaps Identified by this Document

The Montrose DNAPL investigation located along the northeast boundary of the study area (H+A, 2010e) was initiated on October 4, 2010. A report will be prepared when the results of the soil and groundwater sampling have been received from the analytical laboratory. The Companies' investigation of the nature of the UMCf near the GWTS (H+A, 2010g) is expected to be initiated during the fourth quarter 2010. However, this schedule assumes that access will be provided to the Companies by Tronox during the third quarter 2010. Once access is provided by Tronox, and if the work is initiated by late 2010; it is anticipated that the work will be completed by the late first quarter 2011.

4.4.3 Conduct Special Activities in Support of the Groundwater RAS Process

The Companies are presently conducting an evaluation of the existing Site-Wide monitoring program analytical list in order to: 1) determine specific compounds and constituents that are appropriate to effectively monitor the extent and distribution of chemical contamination at the site, and 2) identify compounds and constituents that are relevant to site area decision making. The evaluation will be summarized and presented to NDEP along with the Companies proposal for the 2011 Site-Wide monitoring program submitted to NDEP by November 5, 2010.

5.0 REFERENCES

Hargis + Associates, Inc. [H+A], 2007. Field Sampling and Standard Operating Procedures Site-Wide Soil and Groundwater Investigations, Former Montrose and Stauffer Sites Henderson, Nevada. Revision 2.0. May 11, 2007. [NDEP acceptance status Accepted; May 18, 2007].

_____, 2008. Revision 1.0 Conceptual Site Model, Former Montrose and Stauffer Facilities an Downgradient Areas to Las Vegas Wash, Henderson, Clark County Nevada Replacement Pages. July 25, 2008. [NDEP acceptance status – NDEP Comment provided October 22, 2008; Response to Comments provided November 5, 2008].

_____, 2009a. Proposed 2009 Site-Wide Groundwater Monitoring Program and Reportin Revision 1.0, Henderson Nevada, NDEP Facility ID #s H-00536 and H-000540. May 2 2009.

_____, 2009b. Quarterly Data Submittal, Third Quarter 2009, Groundwater Treatment Syste Henderson, Nevada; November 12, 2009. [NDEP acceptance status: commen provided December 14, 2009]

_____, 2010a. 2010 Site-Wide Groundwater Monitoring Program Plan, Henderson, Nevad Henderson Nevada, NDEP Facility ID #s H-00536 and H-000540. March 11, 2010.

_____, 2010b. 2010 Site-Wide Groundwater Monitoring Program Plan, Henderson, Nevad Follow up to the March 23, 2010 Meeting between NDEP and the Companies. Marc 31, 2010.

_____, 2010c. Response to April 2, 2010 Comments on the 2010 Site-Wide Groundwat Monitoring Program Plan, Henderson, Nevada, Follow-up to the March 23,2010 Meeti between NDEP and the Companies. April 30, 2010.

_____, 2010d. Work Plan to Conoduct an Additional Investigation of the Upper Portion of t Muddy Creek Formation to Support Capture Analysis for the Groundwater Treatme System, Henderson Nevada. May 13, 2010. [NDEP acceptance status – Accepted; Ma 17, 2010].

_____, 2010e. Workplan to Conduct and Additional Middle Zone DNAPL Investigation Revisi 2.0, Henderson Nevada. May 19, 2010.

_____, 2010f. Quarterly Data Submittal, First Quarter 2010, Groundwater Treatment Syste Henderson, Nevada; May 27, 2010.

_____, 2010g. 2009 Comprehensive Groundwater Data Evaluation Report, Revision 1 Henderson Nevada. July 12, 2010.

_____, 2010h. Recommendations to Address Capture East of Extraction Well I and Betwe Extraction Wells C and J; Groundwater Treatment System, Henderson Nevad September 30, 2010.

REFERENCES, Continued

Nevada Division of Environmental Protection (NDEP), 2009a. Hydrogeologic and Lithologic Nomenclature Unification, BMI Plant Sites and Common Areas Projects, Henderson, Nevada. January 6, 2009.

_____, 2009b. Cation-Anion Balance – Updated Guidance, BMI Plant Sites and Common Areas Projects, Henderson, Nevada. September 28, 2009.

Site-Wide Soil Gas Human Health Risk Assessment
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Henderson, Nevada

November 22, 2010

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ACRONYM LIST

Acronym	Meaning
AP&CC	American Potash and Chemical Company
AT	Averaging time
ATSDR	Agency for Toxic Substances Disease Registry
BCL	Basic comparison level
Bgs	Below ground surface
BMI	Black Mountain Industrial
BRC	Basic Remediation Company
Cal-EPA	California Environmental Protection Agency
CLP	Contact Laboratory Program
COC	Chain-of-custody
COPC	Chemical of potential concern
CSM	Conceptual site model
DQA	Data quality assessment
DQI	Data quality indicator
DQO	Data quality objective
DVSR	Data validation summary report
EC	Exposure concentration
ECAO	Environmental Criteria And Assessment Office
ED	Exposure duration
EDD	Electronic data deliverable
EF	Exposure frequency
EPC	Exposure-point concentration
ET	Exposure time
GC	Gas chromatograph
HEAST	Health Effects Assessment Summary Tables
HEC	Human equivalent concentration
Hg	Mercury
HI	Hazard Index
HRA	Health Risk Assessment
IAQ	Indoor air quality
ILCR	Incremental lifetime cancer risk
IRIS	Integrated Risk Information System
ITRC	Interstate Technology Regulatory Council
J&E	Johnson and Ettinger
LCS	Laboratory control sample
LOAEL	Lowest observed adverse effect level
LOU	Letter of Understanding
MDEQ	Michigan Department of Environmental Quality
MOA	Mode of action
MS	Mass spectrometer

Acronym	Meaning
NCEA	National Center for Environmental Assessment
NDEP	Nevada Division of Environmental Protection
NOAEL	No observed adverse effect level
PARCC	Precision, accuracy, representativeness, comparability, and completeness
PBPK	Physiologically-based pharmacokinetic
PNNL	Pacific Northwest National Laboratories
PPRTV	Provisional peer-reviewed toxicity value
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RfC	Reference concentration
RME	Reasonable maximum exposure
RPD	Relative percent difference
RSD	Relative standard deviation
RZ	Remediation Zone
SGSSL	Soil gas site specific level
SOP	Standard operating procedure
SQL	Sample quantitation limit
SRC	Site-related chemical
SSL	Soil screening level
TCE	Trichloroethene
UCL	Upper confidence limit
URF	Unit risk factor
U.S. EPA	U.S. Environmental Protection Agency
VF	Volatilization factor
VOC	Volatile organic compound
WECCO	Western Electrochemical Company

EXECUTIVE SUMMARY

On behalf of Tronox LLC (Tronox), Northgate Environmental Management, Inc. (Northgate) and Exponent, Inc. (Exponent) have prepared this Site-Wide Soil Gas Human Health Risk Assessment (HRA) for the Tronox facility in Henderson, Nevada (the Site). This HRA has been conducted following the methods presented in the March 9, 2010 *HRA Work Plan* (Northgate, 2010a), which was approved by the Nevada Division of Environmental Protection (NDEP) on March 16, 2010. The objective of the HRA was to evaluate the potential for adverse health impacts that may occur as a result of potential exposure to chemicals in soil gas via inhalation of indoor or outdoor air.

Based on the Conceptual Site Model (CSM) for the Tronox facility, potential exposure to chemicals in soil gas was evaluated for future indoor commercial workers via inhalation of indoor air and future outdoor commercial workers via inhalation of outdoor air. Potential exposure to residual chemicals in soil at the Site and the potential for leaching of chemicals in soil to groundwater are being evaluated separately; therefore, these media were not evaluated in this report.

Soil gas data collected as part of the Phase B Source Area Investigation Soil Gas Survey were evaluated and considered useable for purposes of this HRA. Chemicals of potential concern (COPCs) were selected according to a multi-step process, including a toxicity screen, frequency of detection, and CSM considerations. Based on this process, eight chemicals (benzene, bromodichloromethane, carbon tetrachloride, chloroform, hexachlorobutadiene, naphthalene, tetrachloroethene, and trichloroethene) were selected as COPCs. The results of the HRA can be summarized as follows:

Site –Wide Findings

- Non-cancer hazard indices associated with inhalation of vapors in indoor and outdoor air and theoretical excess cancer risks associated with inhalation of vapors in outdoor air were below NDEP's point of departure (hazard index of 1 and cancer risk of 1×10^{-6}).
- Theoretical excess cancer risks associated with inhalation of vapors in indoor air range from 2×10^{-9} (SG94, located in Remediation Zone [RZ]-C) to 1×10^{-4} (SG32, also located in RZ-C). Chloroform is the largest contributor to the overall risk (up to >99%) at the majority of locations. Carbon tetrachloride also contributes to the overall risk (up to 43%) at some locations. None of the other COPCs had total excess cancer risk estimates greater than 1×10^{-6}.

Area-Specific Findings

The designation of the RZs within the main fenced Tronox facility was primarily based on soil investigation findings, which may not be the most appropriate basis for designating soil gas exposure areas. Nevertheless, risk estimates were provided for RZ-A through RZ-E as well for several parcels adjacent to the Tronox facility.

- For RZ-A and all the parcels, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air are at or below 1×10^{-6} and hazard index values are well below 1.
- For RZ-B, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 5×10^{-9} to 9×10^{-5}, with the highest risk estimates near Unit Buildings 3 and 4 in the east-central portion of RZ-B. The area of higher estimated risks is consistent with higher chloroform concentrations in shallow groundwater in this area of the site.
- For RZ-C, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 2×10^{-9} to 1×10^{-4} with the highest risk estimates clustered along the western property boundary and in the east-central portion of the site, areas that coincide with elevated concentrations of chloroform and carbon tetrachloride in shallow groundwater.
- For RZ-D, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 5×10^{-8} to 2×10^{-5} with the high risk estimates clustered along the western property boundary, which again coincides with elevated concentrations of chloroform in shallow groundwater.
- For RZ-E, there are only two soil gas sampling locations and the total excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air at both of these locations is 3×10^{-6}.

There are multiple sources of uncertainty associated with the HRA results, particularly regarding model predictions of indoor air concentrations. Site-specific data were used when possible to reduce uncertainty. There is relatively little guidance on appropriate values for two parameters, i.e., air exchange rate and the vapor flow rate into commercial buildings. The above results are based on conservative (i.e., heath-protective) assumptions for these two parameters. If less conservative, but still reasonable, assumptions are used, the estimated excess cancer risks and

non-cancer hazard indices are a factor of four lower (i.e., on a site-wide basis, excess cancer risks drange from 6×10^{-10} to 3×10^{-5}).

Data usability and data quality assessments indicate that sufficient data are available to support the results of this HRA. Findings from this site-wide soil gas HRA will be incorporated into the RZ and parcel-specific risk assessments, as appropriate, to allow for risk management decisions.

1.0 INTRODUCTION

On behalf of Tronox LLC (Tronox), Northgate Environmental Management, Inc. (Northgate) and Exponent, Inc. (Exponent) have prepared this Site-Wide Soil Gas Human Health Risk Assessment (HRA) for the Tronox facility in Henderson, Nevada (the Site). This HRA has been conducted following the methods presented in the March 9, 2010 *HRA Work Plan* (Northgate, 2010a), which was approved by the Nevada Division of Environmental Protection (NDEP) on March 16, 2010.

1.1 Site Description and History

The approximately 450-acre Site is located approximately 13 miles southeast of the city of Las Vegas in an unincorporated area of Clark County, Nevada, and lies in Sections 1, 12, and 13 of Township 22 S, Range 62 E, (see Figure 1). The site is located within the Black Mountain Industrial (BMI) complex, which consists of several facilities, owned and operated by chemical companies, one of which is Tronox. The City of Henderson surrounds the BMI complex, which is an unincorporated Clark County "island."

The BMI complex was first developed by the U.S. government in 1942 as a magnesium plant for World War II operations. Later, a part of the BMI complex was leased by Western Electrochemical Company (WECCO), which would ultimately become the Tronox Site. WECCO produced manganese dioxide, sodium chlorate, sodium perchlorate, and other perchlorates. WECCO also produced ammonium perchlorate (a powerful oxidizer) for the Navy during the early 1950s using a plant that was constructed on the Site by the Navy. WECCO merged with American Potash and Chemical Company (AP&CC) in 1956, which continued production of ammonium perchlorate for the Navy. In 1967, AP&CC merged with Kerr-McGee Corporation (Kerr-McGee) and added production of boron chemicals in the early 1970s. The production processes included elemental boron, boron trichloride (a colorless gas used as a reagent in organic synthesis), and boron tribromide (a colorless fuming liquid compound used in a variety of applications). The production of boron tribromide was discontinued in 1994, and the production of sodium chlorate and ammonium perchlorate was discontinued in 1997 and 1998, respectively. Perchlorate was reclaimed at the Site using existing equipment until early 2002.

In 2005, Kerr-McGee Chemical LLC was renamed Tronox LLC. Tronox's Henderson facility continues to produce electrolytic manganese dioxide, used in the manufacture of alkaline batteries; elemental boron, a component of automotive airbag igniters; and boron trichloride,

used in the pharmaceutical and semiconductor industries and in the manufacture of high-strength boron fibers for products that include sporting equipment and aircraft parts.

During the 1970s, the U.S. Environmental Protection Agency (U.S. EPA), the State of Nevada, and Clark County investigated potential environmental impacts from the BMI companies' operations, including atmospheric emissions, groundwater and surface-water discharges, and soil impacts (Ecology and Environment, 1982). From 1971 to 1976, Kerr-McGee modified its manufacturing process and constructed lined surface impoundments to recycle and evaporate industrial wastewater. In 1976, the facility achieved zero discharge status regarding industrial wastewater management. In 1980, the U.S. EPA requested specific information from the BMI companies regarding their manufacturing and waste management practices by issuing Section 308 letters. In 1993, a Phase I site assessment was completed for the Site and approved by NDEP. In 1994, NDEP issued a Letter of Understanding (LOU) to Kerr-McGee that identified 69 specific areas or items of interest and indicated the level of environmental investigation they wanted Kerr-McGee to conduct. In 1996, Kerr-McGee completed a Phase II site assessment, which included field sampling as described in an NDEP-approved Phase II Work Plan.

Tronox has continued to undertake environmental investigations to assess environmental conditions at the Henderson facility. A detailed discussion of the specific areas or items of interest identified in the LOU, and a list of the products made, years of production, and approximate waste volumes for WECCO, AP&CC, and Tronox are found in the *Conceptual Site Model (CSM) Report* (ENSR, 2005).

Background information, including local geology, hydrogeology, and wind direction, is also described in the *Conceptual Site Model (CSM) Report* (ENSR, 2005). In general, groundwater is encountered in the fine-grained facies within the uppermost Muddy Creek Formation. The depth to groundwater ranges from about 27 to 80 feet below ground surface (bgs) and is generally deepest in the southernmost portion of the Site. The prevailing wind direction for the site is from the Southwest and the South or West with the Olin property located up-wind (west) and the Timet property located down-wind (east) from the Site (see Figure 1 for wind-rose). Based on the prevailing wind direction, the nearest down-wind residences are located approximately 300 feet from the northern parcels (Parcels A and I), but more than 2000 feet from the fenced main Tronox facility.

1.2 Overview of Site Investigation

The details of the soil gas sampling at the Site are provided in the *Phase B Source Area Investigation Soil Gas Survey Work Plan* (Soil Gas Work Plan; ENSR 2008a), which was approved by NDEP in March 2008. Briefly, soil gas samples were collected at 95 locations across the site as shown on Figure 2; field duplicates were collected at 10 locations. The majority of these locations are within the fenced main Tronox facility; however, several soil gas samples were also collected from locations within several adjacent parcels, some of which have been investigated by the Basic Remediation Company (BRC) independent of Tronox's Source Area investigation. Sample locations were based on the *Phase A Source Area Investigation Results* (ENSR, 2007), which identified the presence of several volatile organic compounds (VOCs) in soil and/or groundwater at the Site, including chloroform and trichloroethene (TCE); historic soil and groundwater data collected from prior investigations; and from groundwater studies performed since the Phase A investigation by Hargis + Associates (2008) as part of their work for companies located west of the Tronox facility.

1.3 Scope of the Site-Wide Soil Gas Health Risk Assessment

The objective of this HRA is to evaluate the potential for adverse human health impacts that may occur as a result of potential exposures to chemicals in soil gas via inhalation of indoor or outdoor air. As presented in the approved *HRA Work Plan* (Northgate, 2010a), potential exposure to residual chemicals in soil and potential for leaching of chemicals in soil to groundwater are being evaluated separately; therefore, these media are not evaluated in this report. Following completion of these assessments, the cumulative risks from soil and soil gas will be documented for risk management decisions. Additionally, consistent with the *HRA Work Plan*, ecological habitat is not currently sufficient to warrant an ecological risk assessment, nor will it be in the future.

The HRA follows the basic procedures outlined in the U.S. EPA's *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual* (U.S. EPA, 1989). Other guidance documents consulted in formulating the risk assessment include:

- Guidelines for Exposure Assessment (U.S. EPA, 1992a).
- Exposure Factors Handbook (U.S. EPA, 1997).
- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (U.S. EPA, 2002).

- Nevada Administrative Code Chapter NAC 445A. Adopted Permanent Regulation of the Nevada State Environmental Commission. LCB File No. R119-96 (NDEP 1996).
- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) (U.S. EPA, 2009).

1.4 Organization of Report

The remainder of this assessment is organized as follows:

- **Section 2, Exposure Scenarios and Conceptual Site Model:** This section describes the relationships between the suspected sources of chemicals identified at the Site, the mechanisms by which the chemicals might be released and transported in the environment, and the means by which the receptors could come in contact with the chemicals, and presents the CSM.
- **Section 3, Data Evaluation, Usability, and Selection of Chemicals of Potential Concern:** This section discusses the sources of analytical data that are used in the HRA and procedures used to evaluate the data and select the chemicals of potential concern (COPCs).
- **Section 4, Exposure Assessment:** This section presents the equations and input values used to calculate potential exposure for each of the identified COPCs.
- **Section 5, Toxicity Assessment:** This section presents the toxicity criteria used to evaluate the COPCs.
- **Section 6, Risk Characterization:** The risk characterization section presents the estimated risks and hazard indices associated with potential exposure to the COPCs for the scenarios evaluated. In addition, an uncertainty analysis discusses the relative impact of the primary assumptions used in the assessment.
- **Section 7, Conclusions:** This section summarizes the conclusions of the report.
- **Section 8, References:** This section provides complete references for the literature cited throughout the report.

2.0 EXPOSURE SCENARIOS AND CONCEPTUAL SITE MODEL

The exposure scenarios considered in this HRA are dependent on the relevant exposure pathways and receptor populations for the Tronox facility. The CSM is a tool used in risk assessment to describe relationships between chemicals and potentially exposed human receptor populations, thereby delineating the relationships between the suspected sources of chemicals identified at the Site, the mechanisms by which the chemicals might be released and transported in the environment, and the means by which the receptors could come in contact with the chemicals. The CSM provides a basis for defining data quality objectives (DQOs), guiding site characterization, and developing exposure scenarios.

2.1 Sources and Release Mechanisms

As described in the Soil Gas Work Plan (ENSR, 2008a), the Phase A Source Area investigation focused on soil and groundwater conditions associated with site-related chemicals (SRCs), including VOCs, and their suspected source areas. VOCs were reported sporadically in the Phase A soil samples (ENSR, 2007). Chloroform was detected most frequently (~50% of the samples) and generally at depths below 15 to 20 ft bgs, which is consistent with the presence and distribution of chloroform in groundwater. The Phase A investigation samples revealed a plume of chloroform, and to a lesser extent TCE, in groundwater located in the central portion of the Site, potentially emanating from the Unit 3 and Unit 4 buildings, and another plume of VOCs, principally chloroform and to a lesser extent benzene, located along the western site boundary, possibly from an off-site source to the west (ENSR, 2007). The results from the Phase B soil and groundwater investigations are generally consistent with these results.

From a review of historic information and Phase A investigation results, the following areas were identified in the Soil Gas Work Plan as potential sources of VOCs or areas where VOCs had been detected in soil and/or groundwater (ENSR, 2008a):

- Former Hardesty Chemical Company site (LOU 4)
- Onsite portion of the Beta Ditch, including small diversion ditches (LOU 5)
- Old P-2, Old P-3, and New P-2 Ponds, and Ponds S-1 and P-1 (LOUs 7, 8, 9, 13, and 14)
- Ponds AP-1 through AP-5 (LOUs 16, 17, 18, and 19)
- Former Truck Emptying/Dumping Site (LOU 35)
- Satellite Accumulation Point/AP Maintenance Shop (LOU 39
- Unit 4 Basement and Old Sodium Chlorate Plant Decommissioning (LOU 43)

- Diesel Storage Tank Area (LOU 45)
- AP Plant Area Change House/Laboratory Septic Tank (LOU 54)
- Acid Drain System (LOU 60)
- Former State Industries, including impoundments and catch basin (LOU 62)
- Southern Nevada Auto Parts site (Pick-a-Part) (LOU 68)

Potential release mechanisms from above-ground source areas, such as spills, leaks, or accidents, could have released VOCs to surface soils. These VOCs may have then leached into subsurface soils and eventually migrated to groundwater. In addition, subsurface sources such as below-ground piping may have released VOCs to the subsurface that may subsequently have migrated to groundwater via leaks or accidents. Finally, chemicals in off-site groundwater appear to be migrating onto the Tronox facility along the western property boundary. In addition to the potential primary release mechanisms, secondary release mechanisms may include volatilization of chemicals in groundwater and soil into indoor or outdoor air.

2.2 Potential Receptors and Exposure Pathways

The identification of potentially exposed populations and exposure pathways is supported by the CSM. For a complete exposure pathway to exist, each of the following elements must be present (U.S. EPA, 1989):

- A source and mechanism for chemical release;
- An environmental transport medium (i.e., air, water, soil);
- A point of potential human contact with the medium; and
- A route of exposure (e.g., inhalation, ingestion, dermal contact).

As discussed previously, the Site is a currently-operating industrial facility. In the future, the Site will continue to be used for industrial and/or commercial purposes. Accordingly, for purposes of evaluating long-term exposure to VOCs in indoor or outdoor air, current and future "on-Site receptors" include long-term indoor workers and long-term outdoor workers (U.S. EPA, 2002). Other potential on-Site receptors, such as visitors or trespassers, do not warrant assessment. As discussed by U.S. EPA (2002), evaluation of exposures to members of the public under a non-residential land-use scenario is not warranted for two reasons:

1. Public access is generally restricted at industrial sites, and

2. While the public may have access to commercial sites, on-site workers have a much higher exposure potential, as they spend substantially more time at a site.

Finally, it is possible that short-term construction workers may be exposed to VOCs in outdoor air. This exposure pathway may be of particular concern when high concentrations of VOCs are present in surface soil and construction activities can enhance the volatilization of these chemicals into the outdoor air (U.S. EPA, 2002). However, this is not the case at the Tronox facility because VOCs are generally not present in near surface soil and the source of chemicals to outdoor air is primarily affected groundwater. As such, the magnitude of exposure to VOCs in outdoor air by short-term construction workers is expected to be substantially lower than that estimated for long-term outdoor workers and was not evaluated separately in this HRA.

2.3 Conceptual Site Model

Based on the source and release mechanisms identified above, Figure 3 presents the following exposure pathway and receptor populations that are considered in the HRA:

- Indoor commercial workers
  - Indoor inhalation of VOCs from soil and groundwater
- Outdoor commercial workers
  - Outdoor inhalation of VOCs from soil and groundwater

As noted in the approved *HRA Work Plan* (Northgate, 2010a), outdoor inhalation of VOCs from soil and groundwater will be quantitatively evaluated only if warranted based on indoor exposures because modeled indoor air concentrations will be substantially greater than modeled outdoor air concentrations.

3.0 DATA EVALUATION, USABILITY, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

This section discusses the soil gas investigation program and procedures, sources of analytical data that are used in this HRA, and procedures used to evaluate the data (data usability) and to select COPCs.

3.1 Soil Gas Sampling Investigation Program and Procedures

Soil gas samples were collected as part of the Phase B investigation in accordance with the Soil Gas Work Plan (ENSR, 2008a). This investigation is the sole source of soil gas data included in this HRA. As specified in the Soil Gas Work Plan, soil gas samples were collected using direct-push technology. Temporary soil gas probes were installed using a track-mounted Geoprobe rig. Soil gas sampling procedures followed the methods described in BRC's Standard Operating Procedure (SOP) 37- Active Soil Gas Investigation (ERM and MWH, 2007). Soil gas samples were collected into six-liter Summa canisters and analyzed for VOCs according to EPA Method TO-15. Although the Work Plan indicated that most samples were to be collected from 10 feet bgs, the procedure was modified to generally collect samples at 5 feet bgs, which is consistent with SOP 37. In the vicinity of Unit Building 3, Unit Building 5 and Unit Building 6, four samples were obtained at 20 feet bgs (SG-36, SG-37, SG-38 and SG-41). SG-41 was obtained near Unit Building 3 where the basement is occupied with engineering staff.

To ensure that ambient air was removed from the sample train and that soil gas samples were characteristic of subsurface conditions, a purge volume versus contaminant concentrate test was performed at SG83 near the western boundary of the Site. Stepped purge tests of one, three and seven purge-volumes were conducted on samples from SG83 to determine purge volumes to be applied to the remainder of the sampling. As shown in the Data Validation Summary Report (DVSR) soil gas table ("Volatile Organic Compounds and Helium Concentrations in Soil Gas"), the VOC concentrations were similar for the three different purge volumes (ENSR, 2008b). Based on these results, ENSR reported that three sample train volumes was chosen as the standard volume to be purged prior to collection of soil gas form the rest of the Site.

Helium was used at each sample location as a tracer gas or leak-check compound as a means of checking for leaks during collection of soil gas samples. Ambient air has the potential to leak into the sampling system during sampling, which could dilute samples and produce results that underestimate actual Site conditions or contaminate the sample with external contaminants. Leakage can potentially occur at sample system connections, at surface seals (i.e., around rods and tubing), or at the top of the temporary soil gas probes. Accordingly, a shroud was placed

over the sampling apparatus, helium was introduced into the shroud and the concentration measured. When helium was detected in the soil gas sample at a concentration above 1% of the concentration in the shroud, a second soil gas sample was collected to replace the original sample. All helium samples were analyzed by EPA Method 3C (ENSR, 2008a,b). As discussed in the DVSR correspondence with NDEP on this issue (Attachment C of DVSR), the Interstate Technology Regulatory Council (ITRC) lists helium as an acceptable tracer compound for soil gas surveys (ITRC, 2007). Additionally, the presence of helium in a sample will not interfere with the TO-15 VOC analysis and the required reporting limits can still be achieved.

As reported by ENSR, a leak check was performed to ensure that there were no leaks of ambient air along the sample train. With the Summa™ canister valve closed and the valve connecting the subsurface portion of the sample tubing also closed, the leak check consisted of creating a vacuum (30-inches of mercury [Hg]) along the sample train for at least 5 minutes while monitoring the in-line vacuum gauge. Once the leak-check test confirmed that there were no leaks along the sample train, the canister valve and the valve leading to the subsurface sample tubing were opened and the Summa™ canister was filled with soil gas. The filled Summa™ canister was labeled and logged on chain-of-custody (COC) forms. The canisters were shipped to Columbia Analytical Services – Air Laboratory in Simi Valley, California. Appendix A contains the soil gas sampling field data and survey photographs.

3.2 Data Usability

The primary objective of the data usability evaluation is to identify appropriate data for use in the HRA. Evaluation of the site-wide soil gas analytical data in terms of usability for this assessment, was conducted in accordance with the criteria presented in the *Guidance for Data Usability in Risk Assessment (Parts A and B)* (U.S. EPA, 1992b,c) and the *NDEP September 2010 Revised Data Usability Guidance, BMI Plant Sites and Common Areas Projects, Henderson, Nevada* (NDEP, 2010a). These criteria include and are discussed in detail below:

- Reports to risk assessors
- Documentation review
- Data sources
- Analytical methods and detection limits
- Data review
- Data quality indicators

3.2.1 Criterion I –Reports to Risk Assessors

The usability analysis of the site characterization data requires the availability of sufficient data for review. The required information is available from the following documentation associated with the site data and data collection efforts:

- A property description is provided in the Soil Gas Work Plan (ENSR, 2008a). The Phase B Investigation Work Plan for Areas I, II, III and IV (AECOM, 2008) also identifies the location and features of the property, the characteristics of the vicinity, and contaminant transport mechanisms.
- A site map with sample locations and sampling design and procedures were provided in the Soil Gas Work Plan (ENSR, 2008a) and is also provided as Figure 2 to this report.
- Data are presented in the Revised DVSR (ENSR, 2008b, attached as Appendix B). Soil gas samples were collected from May 7 through May 29, 2008. Validation of laboratory data was completed by August 19, 2008 and a draft DVSR was submitted to NDEP on August 25, 2008. NDEP provided comments to the draft DVSR on September 18, 2008 and September 30, 2008. Tronox provided responses to NDEP comments on September 29, 2008, and submitted a revised DVSR submitted on October 13, 2008. The Revised DVSR was approved by NDEP on October 20, 2008.
- The laboratory provided a quality assurance/quality control (QA/QC) narrative with each analytical data package, and the data review provides a narrative of qualified analytical results. A description of the analytical methods and detection limits are included. These narratives are included as part of the Revised DVSR.
- Method-specific QC results are provided in each laboratory report, along with associated raw data. The laboratory reports and QC results are included as part of the Revised DVSR.
- Data flags used by the laboratory were defined adequately and are further discussed in below.
- Laboratory reports include the name and address of the laboratory, unique identification of the test report, client and project name, and dates of sample receipt and analysis. Each analytical report describes the analytical method used, and provides results on a sample-by-sample basis along with sample-specific quantitation limits (SQLs), gas chromatography/mass spectroscopy (GC/MS) tuning, initial and continuing calibrations, method and canister blanks, surrogate spike recoveries, internal standard results, laboratory control samples, field duplicate results, laboratory duplicate results, target compound identification and dilution factors. Reported sample analysis results were imported into the project database.

The Revised DVSR and accompanying lab reports (ENSR, 2008b) and the Soil Gas Survey Work Plan (ENSR, 2008a) were considered complete for HRA purposes.

3.2.2 Criterion II – Documentation Review

The objective of the documentation review is to confirm that the analytical results provided are associated with a specific sample location and collection procedure, using available documentation. For the purposes of this data usability analysis, the COC forms prepared in the field were reviewed and compared to the analytical data results provided by the laboratory to ensure completeness of the data set. Based on the documentation review, all samples analyzed by the laboratory were correlated to the correct geographic location at the property. All soil gas locations were surveyed as described in BRC SOP-10 (ERM and MWH 2007). Reviewed reports provide adequate information regarding sample results related to location and sampling procedures.

3.2.3 Criterion III – Data Sources

The review of data sources is performed to ensure that the analytical techniques are appropriate to identify the COPCs, appropriate analytical methods have been used and that adequate sample coverage of source areas has been obtained. Soil gas samples were collected from a total of 95 locations across the Tronox facility and within several additional adjacent parcels. The soil gas sampling locations are shown in Figure 2. Soil gas samples were analyzed for VOCs by EPA Method TO-15, which includes 71 analytes. The placement of the site-wide sample locations was based on review of Phase A soil data (ENSR, 2007) and historical groundwater data collected from prior investigations (Hargis + Associates, 2008). VOCs were not reported frequently in the Phase A soil samples (ENSR, 2007) and this was confirmed by the Phase B soil results.

As noted in the CSM discussion (Section 2), soil gas locations were placed at LOUs where VOCs may have been used in past operations. Soil gas locations were also selected to evaluate potential on-site and western off-site site boundary groundwater plumes, while other locations were spread randomly throughout the site to obtain overall coverage. Some soil gas locations were co-located near groundwater monitoring wells. The placement of the soil gas sample locations was deemed representative to evaluate site-wide soil gas conditions in context of the CSM.

3.2.4 Criterion IV – Analytical Methods and Detection Limits

In addition to the appropriateness of the analytical techniques evaluated as part of Criterion III, it is necessary to evaluate whether the detection limits are low enough to allow adequate

characterization of risks. At a minimum, this data usability criterion can be met through the determination that routine U.S. EPA reference analytical methods were used in analyzing samples collected from the property. The SQL for each soil gas analyte was presented in the Soil Gas Work Plan (ENSR, 2008a) and the *Quality Assurance Project Plan* (QAPP) (ENSR, 2008c). NDEP Basic Comparison Levels (BCLs) do not currently exist for soil gas. Therefore, as described in the Soil Gas Work Plan, the SQL was compared to a soil gas comparison level that was set as equal to the U.S. EPA Preliminary Remediation Goal for Ambient Air with U.S. EPA's default attenuation factor of 0.1 applied and further adjusted by dividing the level by a factor of 10, as requested by NDEP. As further discussed in Section 3.4 of this report, Soil Gas Site Specific Levels (SGSSLs) were calculated as part of this HRA for the COPC selection process and to ensure that detection limits were low enough to allow for adequate characterization of risks. Based on review of this information, method detection limits were confirmed to be adequate for risk assessment applications.

3.2.5 Criterion V – Data Review

The laboratory results for the Phase B Source Area Investigation Soil Gas Survey were subjected to formal data validation following the guidance on data validation provided by NDEP for the BMI Plant Sites (NDEP, 2006). The data from the laboratory were submitted as Contract Laboratory Program (CLP)-like data packages in PDF format and EQuIS® format electronic data deliverables (EDDs). The EDDs were imported into an EQuIS® database specifically created for this project. ENSR validated the data using the PDF data packages plus EDDs and subsequently entered the validation qualifiers into the database. Results were compared to the goals stated in the Soil Gas Work Plan (ENSR, 2008a) and QAPP (ENSR, 2008c).

The quality of the analytical results was reviewed by Renee Kalmes, CIH, and Gregory Brorby, DABT, of Exponent. As part of the Revised DVSR, individual validation memoranda were developed for batches of soil gas samples (ENSR, 2008b). Appendix B of the DVSR presents these documents. Exponent reviewed all seven of the ENSR validation memoranda that reported on the following data elements:

- Agreement of analyses conducted with COC requests
- Data package completeness
- Holding times
- Initial and continuing calibrations
- Method blanks/canister blanks

- Surrogate spike recoveries
- Internal standard results
- Laboratory Control Sample results
- Field duplicate results
- Laboratory duplicate results
- Quantitation limits and sample results
- Helium trace gas concentrations

The following summarizes the qualification findings as presented in the Revised DVSR with regard to blank contamination, calibrations, field duplicates, quantitation problems and helium tracer results.

DVSR Table Number	Title	Findings
E-4	Qualification Based on Blank Contamination	A total of 115 sample results were negated (i.e., qualified U) based on the presence of low levels of the common laboratory contaminants methylene chloride, acetone, and 2-butanone, as well as trace levels of benzene, carbon disulfide, ethanol, isopropyl benzene, naphthalene, and vinyl acetate in the method blanks. The majority of these negations were based on the presence of acetone. Target compounds were not in the canister blanks. The samples were collected in canisters verified as clean by the laboratory through routine checks of ten percent of the canisters cleaned.
E-5	Qualification based on Calibration Criteria Exceedances	One positive and nine non-detect results for 1,2-dichlorobenzene were qualified as estimated (J and UJ, respectively) due to the associated initial calibration's % relative standard deviation (RSD) for this compound, which slightly exceeded the method-defined criteria.
E-6	Qualifications based on Field Duplicate Precision	A total of 84 associated field sample result values in nine sample/field duplicate pairs were qualified as estimated (J) based on field duplicate result relative percent differences (RPDs) that exceeded the QAPP criteria. Twenty two different analytes and from two to ten records per analyte were qualified.
E-7	Qualifications based on Quantitation Problems	A total of 25 samples were qualified based on the laboratory qualifier M indicating a possible high bias due to matrix interferences in the GC/MS data. No other quantitation problems were discovered during data validation.
E-8 & E-9	Qualifications based on helium tracer concentrations	The limit is calculated as 1% of the helium concentration in the surface shroud. Four sample data sets were qualified as estimated (J) and one was rejected (R). All but one sample was re-collected later and helium was not detected. With the exception of the one sample, the re-collected data were used in the HRA (See Table E-8). See further discussion under "representativeness."

3.2.6 Criterion VI – Data Quality Indicators

Data quality indicators (DQIs) are used to verify that sampling and analytical systems used in support of project activities are in control and that the quality of the data generated for this project is appropriate for making decisions affecting future activities. No data were qualified as estimated with a low bias (J-). The DQIs address the field and analytical data quality aspects as they affect uncertainties in the data collected for site characterization and risk assessment. The DQIs include "precision", "accuracy", "representativeness", "comparability", and "completeness" (PARCC). The project QAPP provides the definitions and specific criteria for assessing DQIs using field and laboratory QC samples and is the basis for determining the overall quality of the data set. Data validation activities included the evaluation of PARCC parameters, and all data not meeting the established PARCC criteria were qualified during the validation process using the guidelines presented in the Tronox QAPP (ENSR, 2008c).

"Precision" is a measure of the degree of agreement between replicate measurements of the same source or sample. Precision is expressed by RPD between replicate measurements. Replicate measurements can be made on the same sample or on two samples from the same source. Field precision for the soil gas samples was assessed by evaluating the field duplicate results. Field duplicate samples were collected at 10 locations (i.e., SG07, SG26, SG28, SG40, SG41, SG51, SG53, SG56, SG65, and SG83). As indicated above, twenty two different analytes and from two to ten records per analytes were qualified as estimated (J). The primary soil gas constituents of interest, chloroform, had RPDs well below the established QAPP of 50% RPD for soil gas, ranging from 0 to 22% RPD. Laboratory precision was assessed through the RPD results for matrix duplicates. Laboratory duplicates were performed on SG83B-05-07, SG56B-05, SG43B-05, SG35B-05, SG68B-05, SG27B-05, and SG78B-05[1]. The laboratory duplicate precision was acceptable and no results were qualified during validation. In total, a limited data set was qualified as estimated but usable and represents only 1% of the total field sample results dataset.

"Accuracy" measures the level of bias that an analytical method or measurement exhibits. Several QC parameters are used to evaluate the accuracy of reported analytical results:

- Holding times;
- Method Blanks;
- Surrogate spike recovery; and

[1] As indicated in data validation memo "TH536to15wwb," SG78B-05 was reanalyzed because RPDs for selected compounds exceeded acceptance criteria. Upon reanalysis all criteria were met.

- Laboratory Control Sample (LCS) percent recovery.

All samples were analyzed within the method-specified holding time. As indicated above, low levels of the common laboratory contaminants were detected in some method blanks. Blank result validation represents 1.4% of the total data points collected. No target compounds were detected in canister blanks. Surrogate percent recovery met the QC acceptance criteria for all samples in the data set. The LCS percent recoveries met the QC acceptance limits of 70-130% for all sample analyses. No data were qualified as estimated with a low bias (J-).

"Representativeness" is the degree to which data accurately and precisely represent a characteristic of the population at a sampling point or an environmental condition. There is no standard method or formula for evaluating representativeness, which is a qualitative term. "Representativeness" is achieved through selection of sampling locations that are appropriate relative to the objective of the specific sampling task, and by collection of an adequate number of samples from relevant types of locations. As noted in the CSM discussion (Section 2), soil gas locations were placed at LOUs where VOCs may have been used in past operations. Soil gas locations were also selected to evaluate potential on-site and western off-site site boundary groundwater plumes, while other locations were spread randomly throughout the site to obtain overall coverage. Some soil gas locations were co-located near groundwater monitoring wells. The placement of the soil gas sample locations was deemed representative to evaluate site-wide soil gas conditions in context of the CSM.

The possible entrainment of contaminants and dilution of surface air could impact the representativeness of the soil gas samples. Helium, which was used as a tracer gas, was detected at concentrations greater than 1% of that detected in the shroud at four locations (SG42, SG53, SG60, and SG94). If the helium concentration was between 1% and 10% of the shroud average, then the TO-15 VOC analyte results were qualified as estimated (J) based on the possible contamination and dilution by surface air. If the helium concentration exceeded 10% of the shroud average, then the results were rejected (R). Four sample datasets were qualified as estimated and one was rejected based on these criteria. A replacement soil gas sample was collected from all but one of these locations and helium was not detected in these replacement samples (indicated by an R in the sample ID). Therefore, TO-15 data from only a single location (SG17B) were potentially impacted by surface air contamination/dilution. A comparison of the original and replacement sample results (e.g. sample SG53B-05, its duplicate SG53B-05D, the re-placement sample SG53BR-05, and its duplicate SG53BR-05D) indicates the TO-15 analyte results are very consistent regardless of the helium tracer results. This confirms that the assumptions used for data qualification based on helium tracer results were conservative and the

data quality is not significantly impacted when helium results are less than 10% of the surface shroud levels. As further discussed in Section 3.3, the replacement samples that did now show elevated helium concentrations were used in the HRA.

"Completeness" is measured by the total number of acceptable data points and total number of samples collected by source area and exposure area. Field completeness is defined as the percentage of samples actually collected versus those intended to be collected per the Soil Gas Work Plan (ENSR, 2008a). The goal stated in the QAPP for this project was greater than 90% field completeness (ENSR, 2008b). A comparison of the Soil Gas Work Plan sample tables with the database sample IDs indicates that actual field completeness was 100%, exceeding the goal established for the project. This field completeness calculation is based on the total sample locations scheduled in the Soil Gas Work Plan compared to the COC requests sent to the laboratories. All COC requests were faithfully executed by the laboratories, with minor exceptions detailed in the data validation memoranda. Laboratory completeness is defined as percentage of valid data points versus the total expected from the laboratory analyses. The objective stated in the QAPP for this project was greater than 95% laboratory completeness. Actual laboratory completeness was 100% on the basis of sample analysis (i.e., all requested analyses were performed and reported by the laboratories), and 99% completeness based on valid data.

"Comparability" is a qualitative characteristic expressing the confidence with which one data set can be combined with another for purposes of estimating exposure. Comparability is a qualitative expression of the measure of confidence that two or more data sets may contribute to a common analysis. Because this project was an initial site investigation for all of the TO-15 parameters, involving new soil gas sampling locations, there was no historical data set for comparisons. Comparability of data within the investigation was maximized by using standard methods for sampling and analysis, reporting data, and data validation. A single laboratory performed all the analyses to eliminate inter-laboratory variability

3.2.7 Data Usability Conclusions

Evaluation of the soil gas analytical data in terms of usability for the HRA was conducted in accordance with U.S. EPA and NDEP guidance. A small number of data points (6% of the total analytical dataset) were found to be qualified based on minor method blank, field duplicate, and quantitation issues but were deemed acceptable and were not biased low. All results for a single sample were rejected based on helium tracer concentrations and this sample was successfully replaced. Based on the evaluation, all Data Usability requirements were met and, with the

exception of the single sample for which data were rejected, all soil gas data were deemed to be usable for risk assessment

3.3 Summary of Site-Wide Soil Gas Data Used in HRA

As described in Section 3.1, soil gas samples were collected from a total of 95 locations across the main fenced Tronox facility and within several additional adjacent parcels. The soil gas sampling locations are shown in Figure 2. Soil gas samples were analyzed for VOCs by EPA Method TO-15, which includes 71 analytes. A complete set of validated soil gas data for use in the HRA is provided in Appendix C. As discussed above, field duplicate samples were collected at 10 locations. For purposes of this HRA, the data from the field duplicate samples were evaluated in the data usability discussion above; however, only the data from the primary samples were used in the risk assessment calculations. This is consistent with Option1 in the NDEP guidance for Field Duplicates and Field Splits (NDEP 2008a). Specifically, evaluation of the primary soil gas constituents of interest (i.e., chloroform, carbon tetrachloride and TCE) all showed low RPD values between the primary and duplicate sample results and there was no clear pattern indicating that the original result was lower than that the duplicate result. Therefore, use of the primary sample was considered adequately protective from a risk perspective.

In addition, as discussed above, a second sample was collected at the four sample locations in which helium was detected at concentrations greater than 1% of that detected in the shroud and the measured helium concentrations were not elevated; therefore, the data from the second sample was used in the risk assessment calculations. At one of these four locations, a field duplicate was collected during this second sampling event. Consistent with the other locations at which field duplicate samples were collected, the primary sample was used in the risk calculations. Finally, a second sample and field duplicate were collected at location SG65; however, the reason for collecting these samples is unknown. Because results of the original primary sample and its field duplicate and the second primary sample and its field duplicate were comparable and there was no other apparent reason as to why a second sample was collected at this location, the data for the original primary sample were used in the risk assessment calculations.

The soil gas data used in the HRA are summarized in Table 1, including the number of samples, number of detections, minimum and maximum detections, minimum and maximum detection limits, mean, median, standard deviation, and location of maximum detection. Consistent with NDEP (2008b) guidance, one-half the limit of detection was used in calculating the mean, median, and standard deviation; the sample quantitation limit (SQL) was used as the detection limit. Table 1 also includes SGSSLs and the number of detections or detection limits greater than

this value or 10% of this value. SGSSLs were calculated for this HRA because NDEP has not developed BCLs for soil gas.

The SGSSLs were calculated according to the methodology described in Section 4.1.1, assuming a theoretical lifetime excess cancer risk of 1×10^{-6} or a non-cancer hazard index of 1; calculation spreadsheets are provided in Appendix D. SGSSLs could not be calculated for six chemicals due to the absence of regulatory toxicity criteria. Five of these chemicals (1,2-dibromo-3-chloropropane, cis-1,3-dichloropropene, ethyl-t-butyl ether, isopropyl ether, and trans-1,3-dichloropropene) were not detected in any sample, and the maximum detection limits were generally low [less than 1 microgram per cubic meter ($\mu g/m^3$) for four of the five chemicals and 41 $\mu g/m^3$ for the fifth chemical]. The sixth chemical (2-methoxy-2-methyl-butane) was detected in only one sample at a concentration below 1 $\mu g/m^3$ and detection limits were generally low (less than 1 $\mu g/m^3$ and up to 33 $\mu g/m^3$).

As can be seen in Table 1, 65 of the 71 chemicals analyzed were detected in at least one soil gas sample. Only two chemicals (carbon tetrachloride and chloroform) were detected at concentrations exceeding their respective SGSSLs. Chloroform was detected in 100% of the samples at concentrations up to 160,000 $\mu g/m^3$, by far the highest concentration detected in soil gas, with 51 samples exceeding the SGSSL. Carbon tetrachloride was detected in 94% of the samples at concentrations up to 18,000 $\mu g/m^3$, with 3 samples exceeding the SGSSL. Other chemicals detected at concentrations over 1000 $\mu g/m^3$ include tetrachloroethene, TCE, and trichlorofluoromethane.

Finally, no chemical had maximum detection limits greater than their respective SGSSLs; however, the maximum detection limit for four chemicals (1,1,2,2-tetrachloroethane, acrylonitrile, benzyl chloride, and ethylene dibromide) exceeded 10% of their SGSSLs. These chemicals were detected infrequently (1,1,2,2-trichloroethane, acrylonitrile, and benzyl chloride, in 2, 14, and 5 soil gas samples, respectively) at very low concentrations (less than 1 $\mu g/m^3$) or not at all (ethylene dibromide). The majority of the detection limits for these chemicals were also very low (less than 1 $\mu g/m^3$), although some were elevated (up to 42 $\mu g/m^3$ for 1,1,2,2-tetrachloroethane, 46 $\mu g/m^3$ for acrylonitrile, 56 $\mu g/m^3$ for benzyl chloride, and 35 $\mu g/m^3$ for ethylene dibromide) due to sample dilutions.

3.4 Selection of Chemicals of Potential Concern

As described above, 65 of the 71 VOCs analyzed were detected in one or more of the soil gas samples. Of the six chemicals not detected in any sample, five do not have SGSSLs due to the

lack of regulatory toxicity criteria; however, the maximum detection limits for these chemicals were low. The sixth chemical not detected in any soil gas sample, ethylene dibromide, had detection limits that were generally very low and the few elevated detection limits, all below the SGSSL for this chemical, were due to sample dilutions. Exclusion of these six chemicals from the quantitative risk calculations should not affect the overall conclusions of the HRA. Therefore, all 65 chemicals detected in validated soil gas samples were used as the initial list of COPCs, as shown in Table 2. However, to ensure that the risk assessment focuses on those chemicals that contribute the most to the overall risk (U.S. EPA, 1989), a combination of frequency of detection (chemical is detected in less than 5% of the samples) and a toxicity screen were used to further reduce the initial list of potential COPCs based on methods in the approved *HRA Work Plan* (Northgate, 2010a). No chemical was eliminated based solely on frequency of detection.

The chemical toxicity screen used was based on comparison of the maximum detected concentration to a percentage of the SGSSL. To illustrate this SGSSL comparison, Table 2 presents the ratio of the SGSSL divided by the maximum detected soil gas concentration. A ratio >10 indicates that the maximum detected concentration is less than 10% of the SGSSL. A ratio of > 100 indicates that the maximum detected concentration is less than 1% of the SGSSL.

As shown in Table 2, only two chemicals (carbon tetrachloride and chloroform) have maximum detected concentrations greater than their respective SGSSLs (ratios less than 1) and only five additional chemicals (bromodichloromethane, hexachlorobutadiene, naphthalene, tetrachloroethene, and TCE) have maximum detected concentrations greater than 10% of their respective SGSSLs (ratios less than 10). Consistent with the approved *HRA Work Plan* (Northgate, 2010a), these seven chemicals are retained as COPCs.

The remaining detected chemicals generally have very large ratios, indicating that they would not contribute substantially to overall health risk estimates. However, two of these chemicals (benzene and vinyl chloride) are Class A carcinogens, which are normally retained as COPCs regardless of concentration. For purposes of this HRA, benzene is retained as a COPC, but vinyl chloride is not because its ratio of SGSSL to maximum detected concentration was greater than 100 (maximum detected concentration is less than 1% SGSSL).

Finally, one detected chemical (2-methoxy-2-methyl-butane) does not have an SGSSL due to a lack of regulatory toxicity criteria. This chemical was detected in one sample at a concentration less than 1 $\mu g/m^3$ and the detection limits for the remaining samples were also generally below 1 $\mu g/m^3$ and no greater than 33 $\mu g/m^3$. Therefore, exclusion of this chemical from the quantitative risk assessment should not affect the overall conclusions of the HRA.

In summary, based on the toxicity screen evaluation, the following chemicals are identified as COPCs in soil gas and are further evaluated quantitatively in the HRA.

- Benzene
- Bromodichloromethane
- Carbon tetrachloride
- Chloroform
- Hexachlorobutadiene
- Naphthalene
- Tetrachloroethene
- TCE

4.0 EXPOSURE ASSESSMENT

The magnitude of exposure for any given receptor is a function of the amount of the constituent in the exposure medium and the frequency, intensity, and duration of contact with that medium. This section presents the equations and assumptions used to calculate potential exposures for each of the identified COPCs.

4.1 Determination of Representative Exposure-Point Concentrations

A representative exposure-point concentration (EPC) is a COPC-specific and medium-specific concentration used in the dose equation for each receptor and each exposure pathway. In general, U.S. EPA (1992c) recommends using the 95th upper confidence limit (UCL) of the arithmetic mean concentration for purposes of estimating reasonable maximum or upper-end exposures. However, because one purpose of this HRA is to evaluate potential health risks associated with inhalation of vapors in indoor air, and because it is possible for a building to be constructed over an area represented by a single soil gas sampling location, potential health risks were quantified on a sample-by-sample basis in this HRA. For evaluating potential health risks associated with inhalation of vapors in outdoor air, this may be an overly conservative procedure because it is likely that an outdoor worker would spend time over a wider area than an indoor worker. If a COPC was not detected in a particular sample, one-half the SQL was used. The methods used to estimate indoor and outdoor air concentrations from soil gas measurements are discussed in the following sections.

4.1.1 Indoor Vapors

The migration of COPCs in soil gas from the subsurface and dispersion into indoor air were estimated using the U.S. EPA spreadsheet-based Johnson and Ettinger (J&E) model (U.S. EPA 2004), which is based on the vapor intrusion model published by Johnson and Ettinger (1991). The J&E model incorporates both convective and diffusive mechanisms for estimating the transport of vapors emanating from subsurface media impacted by VOCs into indoor spaces. The major assumption/limitation of the J&E model is that the model is one-dimensional and transport is directed exclusively into the building. That is, vapors only migrate upward from the impacted subsurface media and into the building. Lateral deflection due to the presence of low permeability units or multi-dimensional diffusive transport that reduces the amount of VOC mass that may enter the indoor space is conservatively ignored (diffusion is, physically and mathematically, a three-dimensional process). Additionally, the model assumes that the vapors are at their peak concentration at the floor slab of the building, regardless of the actual depth below ground surface that the highest VOC concentration was detected.

Other assumptions/limitations of the J&E Model are as follows (U.S. EPA, 2004):

- Contaminant vapors enter the structure primarily through cracks and openings in the walls and foundation.
- Convective transport occurs primarily within the building zone of influence and vapor velocities decrease rapidly with increasing distance from the structure.
- Diffusion dominates vapor transport between the source of contamination and the building zone of influence.
- All vapors originating from below the building will enter the building unless the floors and walls are perfect barriers.
- All soil properties in any horizontal plane are homogenous.
- The contaminant is homogeneously distributed within the zone of contamination.
- The areal extent of contamination is greater than that of the building floor in contact with the soil.
- Vapor transport occurs in the absence of convective water movement within the soil column (i.e., evaporation or infiltration), and in the absence of mechanical dispersion.
- The model does not account for transformation processes (e.g., biodegradation, hydrolysis, etc.).
- The soil layer in contact with the structure floor and walls is isotropic with respect to permeability.
- Both the building ventilation rate and the difference in dynamic pressure between the interior of the structure and the soil surface are constant values.

Either site-specific or default soil physical parameters, building characteristics, and exposure assumptions contained in the U.S. EPA J&E model spreadsheet model were used in this evaluation. These values are presented in Table 3. The basis and rationale for the site-specific values are discussed in Appendix E. The chemical properties for the COPCs are the default values coded into the U.S. EPA J&E model spreadsheet as downloaded from the U.S. EPA website (http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm). It should be noted that the U.S. EPA J&E model spreadsheet was designed to evaluate a residential scenario. Under this scenario, a resident is assumed to be present at the site for 24 hours per day; hence, there was no need for U.S. EPA to include an input parameter for exposure time. This is not the case for a commercial scenario in which a worker is assumed to be present at the site for 8 out of 24 hours (U.S. EPA, 2010a; Northgate 2010a). Therefore, for purposes of this HRA, the U.S.

EPA J&E model spreadsheet was adjusted to include an input parameter for exposure time. To ensure conservatism, exposure time was not included for purposes of calculating the SGSSLs.

4.1.2 Outdoor Vapors

The migration of COPCs in soil gas from the subsurface and dispersion into outdoor air was estimated using an approach that is analogous to that used by U.S. EPA (2002) to estimate outdoor air concentrations from chemicals in soil for purposes of calculating soil screening levels (SSLs). Specifically, U.S. EPA calculates a soil-to-air volatilization factor (VF), which relates a soil concentration to an air concentration. The volatilization factor is used to estimate the outdoor air concentration as follows:

$$C_{air-outdoor} = \frac{C_{soil}}{VF} \quad (1)$$

Where:

$C_{air\text{-}outdoor}$ = outdoor air concentration (mg/m^3)

C_{soil} = soil concentration (mg/kg)

VF = soil-to-air volatilization factor (m^3/kg)

As shown in Equation E-4 of Appendix E of U.S. EPA's guidance document, the VF is based on a dispersion factor (Q/C_{vol}) and a flux rate (J_T) assuming a unit concentration in soil (1 mg/kg or 10^{-6} g/g). This same relationship can be used to estimate the outdoor air concentration from a known soil gas concentration as follows:

$$C_{air-outdoor} = \frac{Flux}{Q/C_{vol}} \times 10^9 \ \mu g/kg \quad (2)$$

Where:

$C_{air\text{-}outdoor}$ = outdoor air concentration ($\mu g/m^3$)

Flux = maximum diffusive vapor flux from subsurface soil gas source (g/m^2-sec) [calculated as shown below]

Q/C_{vol} = Inverse of the ratio of the geometric mean air concentration to the volatilization flux at the center of square source (g/m^2-sec per kg/m^3) [calculated as shown below]

The maximum diffusive vapor flux from subsurface soil gas source from a known soil gas concentration is calculated as follows (ASTM, 2000):

$$Flux = \frac{C_{sg} \times 10^{-6}\ g/\mu g \times D^{eff} \times 10^{-4}\ m^2/cm^2}{L \times 10^{-2}\ m/cm} \quad (3)$$

Where:

Flux	=	maximum diffusive vapor flux from subsurface soil gas source (g/m^2-sec)
C_{sg}	=	concentration in soil gas ($\mu g/m^3$)
D^{eff}	=	effective diffusion coefficient (cm^2/sec) [calculated as shown below]
L	=	soil gas sampling depth (cm)

As noted in Section 3.1, the majority of soil gas samples were collected at 5 ft bgs, while a few soil gas samples were collected at 20 ft bgs. For purposes of the HRA, a soil gas sampling depth of 5 ft (150 cm) was assumed for all samples for expediency. This is a health-protective assumption for samples collected at 20 ft bgs.

Equation 1 can be rewritten as follows by substituting Equation 2 for the vapor flux:

$$C_{air-outdoor} = \frac{C_{sg} \times 10^{-6}\ g/\mu g \times D^{eff} \times 10^{-4}\ m^2/cm^2}{L \times 10^{-2}\ m/cm \times Q/C_{vol}} \times 10^{9}\ \mu g/kg \quad (4)$$

or

$$C_{air-outdoor} = C_{sg} \times 10^{-6}\ g/\mu g \times \left[\frac{D^{eff} \times 10^{-4}\ m^2/cm^2}{L \times 10^{-2}\ m/cm \times Q/C_{vol}} \times 10^{9}\ \mu g/kg\right] \quad (5)$$

where all of the parameters in brackets represent the inverse of a "soil gas-to-air" VF.

The effective diffusion coefficient is calculated on a chemical-specific basis as follows (ASTM 2000, U.S. EPA 2004):

$$D^{eff} = D_a\left(\frac{\theta_a^{3.33}}{n^2}\right) + \left(\frac{D_w}{H'}\right) \times \left(\frac{\theta_w^{3.33}}{n^2}\right) \quad (6)$$

Where:

D^{eff} = effective diffusion coefficient (cm^2/sec)

D_a = diffusivity in air (cm^2/sec)

Θ_a = soil air-filled porosity (cm^3/cm^3)

N = soil total porosity (cm^3/cm^3)

D_w = diffusivity in water (cm^2/sec)

H' = Henry's law constant (dimensionless)

For purposes of this evaluation, the same chemical- and soil-specific assumptions used for estimating indoor air concentrations were used to estimate outdoor air concentrations.

The inverse of the ratio of the geometric mean air concentration to the volatilization flux at the center of square source is calculated as follows (U.S. EPA, 2002):

$$Q/C_{vol} = A \times exp\left[\frac{(\ln A_c - B)^2}{C}\right] \quad (7)$$

Where:

Q/C_{vol} = Inverse of the ratio of the geometric mean air concentration to the volatilization flux at the center of square source (g/m^2-sec per kg/m^3)

A = Constant; value for Las Vegas = 13.3093

B = Constant; value for Las Vegas = 19.8387

C = Constant; value for Las Vegas = 230.1652

A_c = Areal extent of contamination (acres)

As stated previously, potential health risks were estimated on a sample-by-sample basis. The areal extent of contamination was assumed to be 0.5 acre, which is consistent with the approved *HRA Work Plan* for a commercial worker scenario (Northgate 2010a).

4.2 Exposure Calculations

Reasonable maximum exposures to chemicals were calculated for future onsite indoor and outdoor commercial workers using the exposure pathway–specific dose equations presented below and the exposure input parameters presented in Table 4. The J&E model spreadsheet and output sheets for indoor air are included in Appendix F and dose calculation spreadsheets for outdoor air are included in Appendix H. The methodology used to estimate the average daily exposure concentration (EC) via inhalation of vapors in indoor or outdoor air is based on guidance described in U.S. EPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)* (U.S. EPA, 2009). For chemical carcinogens, lifetime average EC estimates are based on chronic lifetime exposure extrapolated over the estimated average 70-year lifetime (U.S. EPA, 1989), to be consistent with cancer unit risk factors, which are based on chronic lifetime exposures. For non-carcinogens, EC estimates are averaged over the estimated exposure period. The equation used to estimate ECs for non-carcinogens (EC_{nc}) and carcinogens (EC_c) is as follows:

$$EC = \frac{C_{air} \times ET \times EF \times ED_w}{AT}$$

where:

EC = exposure concentration for evaluating exposure to non-carcinogens (EC_{nc}) or carcinogens (EC_c) ($\mu g/m^3$)

C_{air} = chemical concentration in indoor air ($C_{air\text{-}indoor}$) or outdoor air ($C_{air\text{-}outdoor}$) ($\mu g/m^3$)

ET = exposure time indoors (ET_i) or outdoors onsite (ET_o) (hr/day)

EF = exposure frequency indoors (EF_i) or outdoors (EF_o) (days/yr)

ED_w = exposure duration for commercial workers (year)

AT = averaging time (hours); equal to the ED × 365 days/year × 24 hours/day for non-carcinogens (AT_{nc}) and 70 years (average lifetime) × 365 days/year × 24 hours/day for carcinogens (AT_c)

5.0 TOXICITY ASSESSMENT

Inhalation unit risk factors (URFs), which are expressed in units of $(\mu g/m^3)^{-1}$, are chemical-specific and experimentally derived potency values that are used to calculate the risk of cancer resulting from exposure to potentially carcinogenic chemicals. The URF is defined as the 95% UCL of the probability of a carcinogenic response per unit daily concentration of a chemical over 70 years. A higher value implies a more potent carcinogenic potential. Non-cancer inhalation reference concentrations (RfCs), which are expressed in units of mg/m^3, are experimentally derived "no-effect" levels that are used to quantify the extent of toxic effects other than cancer due to exposure to chemicals. The RfC is intended to represent the concentration of a chemical that is not expected to cause adverse health effects, assuming daily exposure over a lifetime, even in sensitive individuals, with a substantial margin of safety. With RfCs, a lower value implies a more potent toxicant. These criteria are generally developed by U.S. EPA risk assessment work groups and are listed in the U.S. EPA risk assessment guidance documents and databases.

Table 5 presents the toxicity criteria used in this assessment based on the following hierarchy (based on U.S. EPA, 2003):

1. Integrated Risk Information System (IRIS)
2. U.S. EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)
3. National Center for Environmental Assessment (NCEA, or other current U.S. EPA sources)
4. Health Effects Assessment Summary Tables (HEAST)
5. U.S. EPA Criteria Documents (e.g., drinking-water criteria documents, drinking-water Health Advisory summaries, ambient water quality criteria documents, and air quality criteria documents)
6. ATSDR toxicological profiles
7. U.S. EPA's Environmental Criteria and Assessment Office (ECAO)
8. Peer-reviewed scientific literature

For carcinogens, the EPA weight-of-evidence classification is identified in the table for each carcinogenic COPC. Originally, EPA used letter designations A through E (U.S.EPA, 1986a). In 1996, EPA proposed replacing the letter designations with narrative descriptions (U.S.EPA, 1996). The information in Table 5 is taken directly from the IRIS database, which contains a mixture of the two classification schemes, depending on when the chemical was last reviewed.

6.0 RISK CHARACTERIZATION

Risk characterization represents the final step in the risk assessment process. In this step, the results of the exposure and toxicity assessments are integrated into quantitative or qualitative estimates of potential health risks. Potential cancer risks and non-cancer adverse health effects are characterized separately. This section also contains a qualitative discussion of the uncertainties associated with this assessment.

6.1 Evaluation of Potential Cancer Risks

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a given chemical at a given concentration. Carcinogenic risks for chemicals in air are evaluated by multiplying the estimated exposure concentration averaged over a lifetime (i.e., EC_c calculated in the exposure assessment) by the chemical's URF. The URF converts the estimated EC_c to incremental risk of an individual developing cancer. According to U.S. EPA (1989), this approach is appropriate for theoretical upper-bound incremental lifetime cancer risks (ILCRs) of less than 1×10^{-2}. Lifetime chemical-specific risks and total Site risks are estimated as follows:

$$Risk_{inhalation} = EC_c \times URF$$

where:

EC_c = exposure concentration for evaluating exposure to carcinogens ($\mu g/m^3$)

URF = unit risk factor $(\mu g/m^3)^{-1}$

and

$$Total\ Site\ Risk = \sum Chemical\ Risk$$

The estimated excess cancer risks for each chemical are summed, regardless of the type of cancer associated with each chemical, to estimate the total excess cancer risk for the exposed individual.

For most chemicals, the NDEP point of departure is a cumulative incremental cancer risk of 1×10^{-6} (NDEP, 2009).[2] U.S. EPA considers 1×10^{-6} to 1×10^{-4} to be the target range for

[2] There are exceptions to this general rule, including dioxins/furans and asbestos, each of which is evaluated separately from other carcinogenic chemicals (Northgate, 2010a).

acceptable risks at sites where remediation is considered (U.S. EPA, 1990). Estimates of lifetime excess cancer risk associated with exposure to chemicals of less than one-in-one-million (1×10^{-6}) are considered to be so low as to warrant no further investigation or analysis (U.S. EPA, 1990). It should be noted that cancer risks in the 1×10^{-6} to 1×10^{-4} range or higher do not necessarily mean that adverse health effects will be observed. Current methodology for estimating the carcinogenic potential of chemicals is believed to not underestimate the true risk, but could overestimate the true risk by a considerable degree.

6.1.1 Indoor Commercial Worker

The results for the indoor commercial worker are divided into two parts. The first part discusses the results for the entire Tronox facility and adjacent parcels as a whole. The second part discusses the results for different subareas (e.g., remediation zones [RZs] within the Tronox facility and adjacent parcels that have been grouped by geographic areas).

6.1.1.1 Site-Wide Results

The estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air are summarized in Table 6, and the calculation spreadsheets are presented in Appendix F. As stated previously, these values were estimated on a sample-by-sample basis. The estimated total cancer risk for each sample location is also shown on Figure 4, and the data have been contoured to show the areas of the site where the estimated total excess cancer risk is greater than 1×10^{-6} and 1×10^{-5} (no values exceeded 1×10^{-4}).[3] For an indoor commercial worker, the total excess cancer risks due to exposure to chemicals in soil gas range from 2×10^{-9} (SG94, located in RZ-C) to 1×10^{-4} (SG32, also located in RZ-C). Chloroform is the largest contributor to the overall risk (up to >99%) at the majority of locations, with individual chemical risk estimates ranging from 5×10^{-10} to 1×10^{-4}. Carbon tetrachloride is another significant contributor to the overall risk (up to 43%) at some locations, with individual chemical risk estimates ranging from 2×10^{-11} to 3×10^{-6}. None of the other COPCs had overall risk estimates greater than 1×10^{-6}.

The highest estimated total cancer risk estimates shown in Figure 4 are along the western boundary of the Tronox facility and in the middle of the facility, around the Unit buildings, extending to the north. Based on the results of the Phase A and B soil and groundwater

[3] The contours were drawn by first entering the excess cancer risk values (in log space) into Surfer and then using the "Natural Neighbors" algorithm with default settings. The "Natural Neighbors" algorithm calculates a weighted average at each location based on nearby values. In some cases, the contours were adjusted manually to more accurately reflect the estimated risk values.

investigations, the primary source of chemicals in soil gas is believed to be shallow groundwater, and the results of this HRA are consistent with that conclusion. The concentrations of chloroform and carbon tetrachloride in shallow groundwater in the vicinity of the Tronox facility are shown in Figures 5 and 6, respectively. These groundwater figures are based on the on-site Phase A/Phase B and compliance data, as well as data for off-site wells obtained from NDEP's regional database. The total risk contours in Figure 4 are similar to the shallow groundwater contours for chloroform, which indicate that there is an off-site chloroform plume extending onto the Tronox facility from the west and an on-site plume extending from the vicinity of the Unit buildings (see Figure 5). With regard to carbon tetrachloride, the highest concentrations in shallow groundwater are also along the western property boundary, which generally corresponds to the soil gas sampling locations with the highest chemical-specific risks for carbon tetrachloride (SG61, SG62, and SG83, all in RZ-C). Finally, although the chemical-specific risks for TCE are relatively low (maximum of 8×10^{-8}), the locations of the highest chemical-specific risk values (SG46 in RZ-A and SG28, SG39, and SG76 in RZ-C) correspond to areas of higher TCE concentrations in shallow groundwater, which are shown in Figure 7. As with Figures 5 and 6, Figure 7 is based on the on-site Phase A/Phase B and compliance data, as well as data for off-site wells obtained from NDEP's regional database.

As stated in Section 3.2.3, some of the soil gas sampling locations were collocated with groundwater sampling locations, and these data were used to further evaluate the relation between chloroform concentrations in soil gas and shallow groundwater. As shown in Table 9, there are a total of 25 pairs of samples in which chloroform was detected in both soil gas and shallow groundwater. These data were plotted and a linear regression model was applied, which showed that the data were reasonable linearly correlated (R^2 of 0.54). However, there are two pairs of samples (SG36/M11 and SG52/MW16) where the soil gas concentration is high, but the shallow groundwater concentration is very low, and these two sets of data points appear to be outliers. When the data were re-analyzed without these samples, the linear correlation was significantly improved (R^2 of 0.94). These data further support the conclusion that the source of chloroform in soil gas is shallow groundwater.

6.1.1.2 Subarea Results

As shown in Table 6, all but one soil gas sampling location has been assigned to an RZ or parcel location group. The designation of the RZ areas was primarily based on soil investigation findings, which may not be the most appropriate basis for designating soil gas exposure areas. Nevertheless, for purposes of this following discussions, the soil gas findings have been subdivided as follows: RZ-A, RZ-B, RZ-C, RZ-D, RZ-E, Parcels A, B, C, D, E, I, and J, and

Parcels F, G, and H. The subarea tables are included in Appendix G and discussed individually below.

Remediation Zone A

There is a total of six soil gas sampling locations in RZ-A. The estimated total excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 1×10^{-8} to 2×10^{-7} (see Table G-1). Chloroform is the largest contributor to the overall risk estimates at five of the six locations (up to 89%), whereas TCE is the largest contributor at the sixth location (SG-47) (43%). This latter result is consistent with the elevated TCE concentrations in shallow groundwater in this area of the site (see Figure 7, groundwater monitoring well M-137). In addition to these six locations within RZ-A, there are nine additional relevant locations within Parcels G and H, and RZ-B that border RZ-A. The total estimated excess cancer risks for these locations are also included in Table G-1. As shown in the table, the overall risks for these adjacent locations range from 2×10^{-9} to 1×10^{-7}, again with chloroform being the largest contributor to the risk estimates at all but one of these locations (up to 92%).

Remediation Zone B

There are a total of 19 soil gas sampling locations in RZ-B. The total estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 5×10^{-9} to 9×10^{-5} (see Table G-2). Chloroform is the largest contributor to the overall risk estimates at all of these locations (up to >99%). As shown in Figure 4, the total excess cancer risk estimates for 5 of the 19 locations (SG-36, SG-40, SG-69 through SG-71) are all located near Unit Buildings 3 and 4 in the east-central portion of RZ-B, with much lower overall risk estimates for locations west, east and south (in Parcel G and RZ-A) of this area. The area of higher estimated risks is consistent with higher chloroform concentrations in shallow groundwater in this area of the site (see Figure 5).

Remediation Zone C

There are a total of 26 soil gas sampling locations in RZ-C. The total estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 2×10^{-9} to 1×10^{-4} (see Table G-3). Chloroform is the largest contributor to the overall risk estimates at all but one of these locations (up to >99%); the one other location, SG94, is located within the Diesel Storage Tank Area (LOU 45), where other

significant contributors to the overall risk estimate include benzene and naphthalene. The total risk estimates for 19 of the 26 locations exceed 1×10^{-6}, and these locations tend to be clustered along the western property boundary and in the east-central portion of the site, areas that coincide with elevated concentrations of chloroform and carbon tetrachloride in shallow groundwater (see Figures 4 through 6).

Remediation Zone D

There are a total of 20 soil gas sampling locations in RZ-D. The total estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 5×10^{-8} to 2×10^{-5} (see Table G-4). Chloroform is the largest contributor to the overall risk estimates at all of these locations (up to >99%). As shown in Figure 4, the total risk estimates for 9 of the 20 locations exceed 1×10^{-6}, and the 7 locations with the highest overall risk estimates are clustered along the western property boundary, which again coincides with elevated concentrations of chloroform in shallow groundwater (see Figure 5).

Remediation Zone E

There are two soil gas sampling locations in RZ-E. The total estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air at both of these locations is 3×10^{-6} (see Table G-5). Chloroform is the largest contributor to the overall risk at both of these locations (96% to 99%), which are located in the east-central portion of the site, coincident with somewhat elevated chloroform concentrations in shallow groundwater (see Figures 4 and 5).

Parcels A through E, I, and J[4]

There are a total of 18 soil gas sampling locations in Parcels A through E, I, and J (5 in Parcel A, 7 in Parcel B, 1 each in Parcels C, D, and E, and 3 in Parcel I; no samples were collected in Parcel J), which are all located north of the main fenced Tronox Facility (see Figure 2). The total estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air at these locations range from 7×10^{-9} to 1×10^{-6} (see Table G-6). Chloroform is the largest contributor to the overall risk estimates at

[4] It is noted that a separate screening-level indoor air health risk assessment was conducted for Parcels A/B soil gas data (Northgate, November 15, 2010). Several assumptions related to the indoor air modeling were specific to soil properties in the vicinity of these parcels and risk estimate results are slightly different from those presented in this Site-Wide report. Both sets of calculations result in risk estimates of less than or equal to 1×10^{-6}.

all of these locations (up to >99%). As shown in Figure 4, while none of the total excess cancer risk estimates exceeded 1×10^{-6}, the largest risk estimates are associated with locations in the southeastern portion of this area, which coincides with somewhat elevated chloroform concentrations in shallow groundwater (see Figure 5). In addition to these 18 locations, there are 5 additional relevant locations within RZ-D, which borders Parcel C. The total estimated excess cancer risks for these locations are also shown in Table G-6. As shown in the table, The overall risks for these adjacent locations range from 5×10^{-8} to 3×10^{-6}, again with chloroform being the largest contributor to the risk estimates at all of these locations (up to 98%). The total excess cancer risk estimate exceeds 1×10^{-6} at only one location (SG90), which is near the center of the northern property boundary, directly down-gradient of the off-site chloroform plume (see Figures 4 and 5).

Parcels F, G, and H

There are a total of three soil gas sampling locations in Parcels F, G, and H (one sample in Parcel G and two samples in Parcel H; no samples were collected in Parcel F). All of these parcels are located south of RZ-C, with Parcel F adjacent to the northwest corner of RZ-B, Parcel G west of the southwest corner of RZ-B and northwest corner of RZ-A, and Parcel H south of RZ-A (see Figure 2). The total estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air at these locations range from 2×10^{-9} to 3×10^{-8} (see Table G-7). Chloroform is the primary contributor to the overall risk estimate for the sample in Parcel G (SG45) (86%), whereas chloroform, benzene and naphthalene are the primary contributors to the overall risk estimates for the samples in Parcel H (on the order of 25% to 40% depending on the chemical and sample). In addition to these three locations within Parcels G and H, there are nine additional relevant locations within RZ-A, RZ-B, and RZ-C that border all three of these parcels. The total estimated excess cancer risks for these locations are also included in Table G-7. As shown in the table, the overall risks for these adjacent locations range from 5×10^{-9} to 6×10^{-5}, with chloroform being the primary contributor to the risk estimates at all but one of these locations (up to 99%). As shown in Figure 4, the total excess cancer risk estimate exceeds 1×10^{-6} at only one location (SG61), which is in RZ-C, along the western property boundary north of Parcel F, within the off-site chloroform plume (see Figure 5). For the remaining locations, including all those in the vicinity of Parcels G and H, the highest overall risk estimate was 4×10^{-7}.

6.1.2 Outdoor Commercial Worker

The estimated excess cancer risks associated with exposure of an outdoor commercial worker to the COPCs in soil gas through inhalation of vapors in outdoor air are summarized in Table 7, and the calculation spreadsheets are presented in Appendix H. These calculations are limited to those COPCs for which estimated exposure to indoor air exceed an excess cancer risk of 1×10^{-6} or hazard index of 1 (i.e., carbon tetrachloride and chloroform), because modeled outdoor air concentrations are orders of magnitude lower than modeled indoor air concentrations. For an outdoor commercial worker, the total excess cancer risks due to exposure to chemicals in soil gas range from 5×10^{-12} to 1×10^{-6}, with chloroform being the largest contributor to the overall risk estimates. These values are equal to or below the lower end of the generally acceptable risk range, indicating that potential exposure to COPCs in soil gas through inhalation of vapors by an outdoor commercial worker should not pose an unacceptable carcinogenic health risk under the conditions evaluated.

6.2 Evaluation of Non-Cancer Health Effects

Non-cancer adverse health effects are evaluated by comparing the estimated exposure concentration (i.e., EC_{nc} estimated in the exposure assessment) with an exposure level at which no adverse health effects are expected to occur for a long period of exposure (i.e., RfC). The EC_{nc} and RfC are compared by dividing the EC_{nc} by the RfC to obtain the EC_{nc}/RfC ratio, as follows:

$$Hazard\ Quotient_{inhalation} = \frac{EC_{nc} \times 10^{-3}\ mg/\mu g}{RfC}$$

where:

EC_{nc} = exposure concentration for evaluating exposure to non-carcinogens ($\mu g/m^3$)

RfC = reference concentration (mg/m^3)

A hazard quotient less than or equal to 1 indicates that the predicted exposure to that chemical should not result in an adverse non-carcinogenic health effect (U.S. EPA, 1989). If more than one chemical is evaluated, the hazard quotients for all COPCs are summed to determine whether exposure to a combination of chemicals poses a health concern. This sum of the hazard quotients is known as a Hazard Index (HI).

$$Hazard\ Index = \sum Hazard\ Quotients$$

The NDEP non-cancer risk management target is a HI value of less than or equal to 1 (NDEP, 2009a). It should be noted that HI or HQ values greater than 1 do not necessarily mean that adverse health effects will be observed, because a substantial margin of safety has been incorporated into many of the RfCs.

6.2.1 Indoor Commercial Worker

The estimated non-cancer hazard quotients and hazard indices associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air are summarized in Table 8, and the calculation spreadsheets are presented in Appendix F. As stated previously, these values were estimated on a sample-by-sample basis. The total hazard indices for an indoor commercial worker due to exposure to chemicals in soil gas range from 0.00001 to 0.1. All of these values are well below 1, indicating that potential exposure to COPCs in soil gas through inhalation of indoor air by an indoor commercial worker should not pose a potential non-carcinogenic health risk under the conditions evaluated. Chloroform is the largest contributor to the overall hazard index at most sampling locations. Other significant contributors to the overall hazard index at some locations include carbon tetrachloride, naphthalene, and tetrachloroethene.

6.2.2 Outdoor Commercial Worker

The estimated non-cancer hazard quotients and hazard indices associated with exposure of an outdoor commercial worker to the COPCs in soil gas through inhalation of vapors in outdoor air are summarized in Table 7, and the calculation spreadsheets are presented in Appendix H. As stated previously, these calculations were limited to carbon tetrachloride and chloroform. For an outdoor commercial worker, the total hazard indices due to exposure to chemicals in soil gas range from 7×10^{-9} to 0.001, with chloroform contributing nearly 100% of the total hazard index. These values are well below 1, indicating that potential exposure to COPCs in soil gas through inhalation of vapors by an outdoor commercial worker should not pose an unacceptable non-carcinogenic health risk under the conditions evaluated.

6.3 Uncertainty Analysis

Uncertainty is inherent in many aspects of the risk assessment process. Uncertainty generally arises from a lack of knowledge as well as variability of (1) site conditions and future site use; (2) toxicity and dose-response of the COPCs; and/or (3) the extent to which an individual may be

exposed (if at all) to the chemicals. This lack of knowledge means that assumptions must be made based on information presented in the scientific literature or on professional judgment. Although some assumptions have significant scientific basis, many do not. The assumptions that introduce the greatest amount of uncertainty, and their effects on the findings of this HRA, are summarized in Table 10, and discussed further below. This discussion is qualitative in nature, reflecting the difficulty in quantifying the uncertainty in specific assumptions. In general, assumptions were selected in a manner that purposely biases the process toward health protection.

6.3.1 Uncertainty Associated with Site Characterization Data

Soil gas samples were collected from 95 locations across the 450-acre Tronox facility and adjacent parcels. As presented in Table 1 of the Soil Gas Work Plan (ENSR, 2008a), the majority of sampling locations were located within one of the 18 LOUs identified as being potential sources of VOCs or in areas where VOCs had been detected in soil or groundwater, and the remaining soil gas sample locations were placed in other areas of the Site. As also noted in Table 1 of the Soil Gas Work Plan, the majority of the sample locations were targeted to evaluate LOUs, off-site groundwater and on-site groundwater as potential sources, and some samples were also targeted to evaluate vapor intrusion into existing buildings. All soil gas samples were analyzed for a full suite of VOCs. Because most of the soil gas sampling locations were targeted, and samples from these locations were analyzed for chemicals associated with historical operations, the relative uncertainty in the site characterization data is considered to be low.

6.3.2 Uncertainty Associated with Data Usability/Data Evaluation

All of the soil gas data were evaluated in a single DVSR. As discussed in Section 3.2, a small number of data points (6% of the total analytical dataset) were found to be qualified based on minor method blank, field duplicate, and quantitation issues but were deemed acceptable and were not biased low. All results for a single sample were rejected based on helium tracer concentrations and this sample was successfully replaced by a second sample collected at this location. Accordingly, with the exception of the single sample for which data were rejected, all soil gas data were deemed to be usable for risk assessment.

6.3.3 Uncertainty Associated with Selection of COPCs

At total of 65 chemicals were detected in at least one soil gas sample and were included in the COPC selection process. Of these 65 chemicals, 8 were identified as COPCs. For those

chemicals that were not selected as COPCs, the maximum detected concentration was generally a factor of 10, if not a factor of 100 or more, lower than the SGSSL; therefore, exclusion of these chemicals from the quantitative risk assessment may slightly underestimate the potential health risks posed by the Site, but to such a small degree as to be inconsequential to the overall results of the HRA.

6.3.4 Uncertainty Associated with Exposure-Point Concentrations

Estimated excess cancer risks and non-cancer hazard indices were calculated on a sample-by-sample basis because it is possible for a building to be constructed over an area represented by a single soil gas sampling location. This approach may over- or underestimate the risk estimates depending on the representativeness of a single sample for an entire building footprint. Furthermore, this may be an overly conservative procedure for purposes of estimating potential health risks associated with inhalation of vapors in outdoor air, because it is likely that an outdoor worker would be spend time over a wider area than an indoor worker.

6.3.5 Uncertainty Associated with Fate-and-Transport Modeling

Fate-and-transport models were used in this HRA to estimate indoor air and outdoor air concentrations from measured soil gas concentrations. For indoor air, the U.S. EPA J&E model spreadsheet was used. As discussed in Section 4.1.1, the J&E model has numerous assumptions and limitations, each of which may over- or underestimate the predicted indoor air concentration. In this case, site-specific soil physical parameters were used in the modeling, which should reduce the uncertainty in the model estimates. For outdoor air, an approach analogous to that used by U.S. EPA to estimate outdoor air concentrations from chemicals in soil was used. This model also has assumptions that may over- or underestimate the predicted concentrations. Two specific areas of uncertainty in the indoor air modeling are further discussed below.

6.3.5.1 Air Exchange Rate and Vapor Flow Rate in Commercial Buildings

There is relatively little guidance on appropriate values for the air exchange rate and vapor flow rate into commercial buildings. As discussed in Appendix E, U.S. EPA recommends a value of 0.25 per hour (0.25/hr) for the air exchange rate for a residential building, but does not provide a recommended value for a commercial building, in their J&E Model User's Guide (U.S. EPA, 2004). The California Environmental Protection Agency (Cal-EPA) recommends a value of 1/hr for commercial buildings (Cal-EPA 2005), whereas the Michigan Department of Environmental Quality (MDEQ) recommends a value of 2/hr (Michigan Environmental Science Board 2001). For purposes of this HRA, the more conservative (i.e., health-protective) value of 1/hr was used.

With regard to the vapor flow rate into a building (Q_{soil}), this value can be calculated based on various site-specific or default values related to soil vapor permeability, pressure differentials, and size of cracks. However, because a wide range of values can be predicted, U.S. EPA provides a recommended "default" value for residential buildings (5 L/m) based on empirical data, but does not provide a recommendation for commercial buildings (U.S. EPA, 2004). Cal-EPA recommends scaling the default residential value based on the size of the commercial building (e.g., if the commercial building is twice the size as the default residential building, then the Q_{soil} value is doubled) rather than allowing the model to calculate this value (Cal-EPA 2005). For purposes of this HRA, the scaled Q_{soil} value (4 × 5 L/m or 20 L/m because the default commercial building size described above is 4-times the default residential building size) was conservatively used.

To assess the uncertainty in using these assumptions, the estimated excess cancer risks and non-cancer hazard indices were re-calculated using less conservative, but still reasonable, values for these parameters (i.e., an air exchange rate of 2/hr based on MDEQ guidance and a calculated Q_{soil} based on site-specific assumptions as originally conceived in the J&E model). The calculation spreadsheets and model output are provided in Appendix F, and the results are shown on Figure 8. The resulting estimates are approximately a factor of four lower (i.e., on a site-wide basis, excess cancer risks range from 6×10^{-10} to 3×10^{-5}), and although there are still areas of the Site where the estimated risks exceed 1×10^{-6}, the extent of that area is substantially smaller.

6.3.5.2 *Indoor Air Quality Study*

In part to assess the uncertainty in the indoor air vapor intrusion exposure pathway, an indoor air quality (IAQ) study has been initiated at the Tronox facility. The first round of indoor and outdoor air samples were collected at several locations throughout the facility in May 2010 (Northgate, 2010b), and analyzed for chloroform, carbon tetrachloride, and TCE. Chloroform and carbon tetrachloride were detected in all but one indoor air sample and all outdoor air samples. TCE was detected in all indoor air samples and some of the outdoor air samples; however, the detection limits in the outdoor samples were elevated due to sampling conditions (Northgate, 2010b). Preliminarily, the measured chloroform and carbon tetrachloride concentrations were lower than that predicted by the J&E model, whereas the measured TCE concentrations were higher than that predicted by the J&E model. A second round of indoor and outdoor air sampling, which is scheduled for December 2010, will provide additional information.

6.3.6 *Uncertainty Associated with Exposure Assessment*

The exposure assessment in this HRA is based on a reasonable maximum exposure (RME) scenario, which is defined by EPA as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site (U.S. EPA, 1989). To achieve this goal, the RME scenario uses highly conservative exposure assumptions. For example, this HRA assumes that a future onsite commercial worker is present at the site 225 days (outdoor worker) or 250 days (indoor worker) per year, for 25 years. These upper-bound, default estimates of exposure most likely overestimate the potential health risks associated with the Site. It should be noted, however, that the HRA was limited to inhalation of vapors in indoor or outdoor air. The potential health risks associated with direct contact with chemicals in soil will be addressed separately for each RZ and the parcels. Finally, it should be noted that potential health risks associated with inhalation of vapors in outdoor air were not evaluated quantitatively for off-Site receptors. However, because (1) off-Site receptors would be exposed to lower concentrations than on-Site receptors; and (2) the estimated health risks for on-Site receptors are below levels of concern, potential health risks to off-Site receptors would also be below levels of concern.

6.3.7 *Uncertainty Associated with Toxicity Assessment*

One of the largest sources of uncertainty in any risk assessment is the limited understanding of toxicity to humans who are exposed to the low concentrations that are generally encountered in the environment. The majority of the available toxicity data are from animal studies; these data are extrapolated using mathematical models or multiple uncertainty factors to predict what might occur in humans. Sources of conservatism in the toxicity criteria used in this HRA include:

- The use of conservative methods and assumptions to extrapolate from high-dose animal studies to predict the possible response in humans at exposure levels far below those administered to animals;
- The assumption that chemicals considered to be carcinogens do not have thresholds (i.e., for all doses greater than zero, some risk is assumed to be present); and
- The fact that epidemiological studies (i.e., human exposure studies) are limited and are not generally considered in a quantitative manner in deriving toxicity values.

In aggregate, these assumptions lead to overestimates of risk, such that the actual risk is unlikely to be higher than the estimated risk, but could be considerably lower. Chemical-specific uncertainties in toxicity criteria are provided below for chemicals that contribute most to the

estimated cancer risks (carbon tetrachloride and chloroform) and HIs (carbon tetrachloride, chloroform, naphthalene, and tetrachloroethene), followed by a discussion regarding chemicals for which surrogate criteria were used, or no criteria were available.

Carbon Tetrachloride

The URF for carbon tetrachloride is based on increased incidence of pheochromocytoma in treated male mice observed in a 2-year chronic inhalation study (U.S. EPA, 2010b). With regard to their confidence in this criterion, U.S. EPA comments that although pheochromocytomas were observed in only one species, the available experimental evidence supports a conclusion that mouse pheochromocytomas are relevant to humans. Further, because there is no information on the mode of action (MOA) for this tumor, the URF is based on a linear low-dose extrapolation approach. Information on the MOA to inform this approach would significantly reduce the uncertainty in this URF (U.S. EPA, 2010b).

The RfC for carbon tetrachloride is based on a chronic 2-year inhalation toxicity study in rats. The critical effect is fatty changes in the liver. The U.S. EPA applied an uncertainty factor of 100 (a factor of 10 for intraspecies differences, a factor of 3 for interspecies extrapolation, and a factor of 3 for database deficiencies) to the $BMCL_{10\ [HEC]}$ [Benchmark concentration representing the lower bound on the response in 10% of the population, adjusted to a human equivalent concentration using a physiologically-based pharmacokinetic (PBPK) model]. U.S. EPA concludes that the overall confidence in the RfC is medium because confidence in the principal animal study is high and confidence in the overall database is medium (lack of an adequate inhalation multigenerational study of reproductive function) (U.S. EPA, 2010b)

Chloroform

The URF for chloroform is based on increased hepatocellular carcinoma in treated female mice observed in a chronic 78-week oral gavage study. With regard to their confidence in this criterion, U.S. EPA comments that an adequate number of animals were treated and observed, and risk estimates derived from mice or rat kidney data are generally supportive of the URF (U.S. EPA, 2010b).

The RfC for chloroform is based on a 1- to 4-year study of workers occupationally exposed to chloroform in a pharmaceutical plant (ATSDR, 1997a). The critical effect is hepatomegaly, which was found in 25% of the chloroform-exposed workers. The Agency for Toxic Substances Disease Registry (ATSDR) applied an uncertainty factor of 100 (a factor of 10 for intraspecies differences and a factor of 10 to extrapolate from a low adverse effect level [LOAEL] to a no

adverse effect level [NOAEL]) to the LOAEL. ATSDR does not comment on their confidence in this value.

Naphthalene

The RfC for naphthalene is based on a 2-year chronic inhalation study in mice (U.S. EPA 2010b). Nasal effects, including hyperplasia and metaplasia were observed in the respiratory and olfactory epithelium, respectively, of treated animals. U.S. EPA applied an uncertainty factor of 3000 (a factor of 10 for intraspecies differences, a factor of 10 for interspecies differences, a factor of 10 to extrapolate from a LOAEL to a NOAEL, and a factor of 3 for database deficiencies) to the LOAEL converted to a human equivalent concentration (HEC). U.S. EPA concludes that the overall confidence in the RfC is low to medium because confidence in the principal study is medium (adequate number of animals, but high mortality), and confidence in the overall database is low to medium (lack of subchronic or chronic studies in other animal species and no reproductive or developmental studies for inhalation exposure) (U.S. EPA, 2010b).

Tetrachloroethene

The RfC for tetrachloroethene is based on a study of women occupationally exposed to tetrachloroethene for an average of ~10 years in dry cleaning shops (ATSDR, 1997b). The critical effect was increased reaction times in a series of neurobehavioral tests. The ATSDR applied an uncertainty factor of 100 (a factor of 10 for intraspecies differences and a factor of 10 to extrapolate from a LOAEL to a NOAEL) to the LOAEL converted from occupational exposure to continuous exposure (i.e., 8/24 hours and 5/7 days). ATSDR cites several other studies in support of their analysis, but otherwise does not comment on their confidence in this value.

Surrogate Criteria and Missing Criteria

Surrogate toxicity criteria were used for the following chemicals as directed by NDEP (2010b):

Chemical	Surrogate
1,2-Dichlorotetrafluoroethane	1,1,2-Trichloro-1,2,2-trifluoroethane
1,3-Dichlorobenzene	1,2-Dichlorobenzene
4-Ethyltoluene	Isopropylbenzene (cumene)

4-Isopropyltoluene	Isopropylbenzene (cumene)
alpha-Methylstyrene	Styrene
cis-1,2-Dichloroethene	trans-1,2-Dichloroethene
n-Butylbenzene	Isopropylbenzene (cumene)
n-Octane	C5-C8 alkanes and cylcoalkanes
sec-Butylbenzene	Isopropylbenzene (cumene)
t-Butyl alcohol	sec-Butyl alcohol
tert-Butylbenzene	Isopropylbenzene (cumene)

None of these chemicals were identified as COPCs; therefore, use of these surrogate toxicity criteria does not affect the conclusion of this HRA.

Finally, one detected chemical (2-methoxy-2-methyl-butane) does not have a regulatory toxicity criterion or other recommended value. As stated in Section 3.4, this chemical was detected in one sample at a concentration less than 1 $\mu g/m^3$ and the detection limits for the remaining samples were also generally below 1 $\mu g/m^3$ and no greater than 33 $\mu g/m^3$. Therefore, exclusion of this chemical from the quantitative risk assessment should not affect the overall conclusions of the HRA.

6.3.8 Uncertainty Associated with Risk Characterization

The uncertainties associated with risk characterization are generally the result of the combined uncertainties in the site conditions, exposure assumptions, and toxicity criteria. In this HRA, potential health risks were quantified for future onsite commercial workers associated with exposure to chemicals in soil gas through inhalation of vapors in indoor or outdoor air. Given the highly conservative nature of the exposure parameters used to characterize this pathway, especially for the RME scenario, it is highly unlikely that the same receptor would be exposed at that level over the entire duration of exposure. These conservative estimates of exposure were then combined with even more conservative estimates of acceptable exposure (RfC) or carcinogenic potency (URF) to estimate the magnitude (non-cancer) or likelihood (cancer) of potential effects.

One source of uncertainty that is unique to risk characterization is the assumption that the total risk associated with exposure to multiple chemicals is equal to the sum of the individual risks for each chemical (i.e., the risks are additive). Other possible interactions include synergism, where

the total risk is higher than the sum of the individual risks, and antagonism, where the total risk is lower than the sum of the individual risks. Relatively few data are available regarding potential chemical interactions following environmental exposure to chemical mixtures. Some studies have been carried out in rodents that were given simultaneous doses of multiple chemicals. The results of these studies indicated that no interactive effects were observed for mixtures of chemicals that affect different target organs (i.e., each chemical acted independently), whereas antagonism was observed for mixtures of chemicals that affect the same target organ, but by different mechanisms (Risk Commission, 1997).

While there are no data on chemical interactions in humans exposed to chemical mixtures at the dose levels typically observed in environmental exposures, animal studies suggest that synergistic effects will not occur at levels of exposure below their individual effect levels (Seed et al., 1995). As exposure levels approach the individual effect levels, a variety of interactions may occur, including additive, synergistic, and antagonistic interactions (Seed et al., 1995).

EPA guidance for risk assessment of chemical mixtures (U.S. EPA, 1986b) recommends assuming an additive effect following exposure to multiple chemicals. Subsequent recommendations by other parties, such as the National Research Council (1988) and the Presidential/Congressional Commission on Risk Assessment and Risk Management (Risk Commission, 1997) have also advocated a default assumption of additivity. As currently practiced, risk assessments of chemical mixtures generally sum cancer risks regardless of tumor type, and sum non-cancer hazard indices regardless of toxic endpoint or mode of action. Given the available experimental data, this approach likely overestimates potential risks associated with simultaneous exposure to multiple chemicals.

In summary, these and other assumptions contribute to the overall uncertainty in the results of the HRA. However, given that the largest sources of uncertainty generally result in overestimates of exposure or risk, it is believed that the non-carcinogenic and carcinogenic risks presented in this HRA represent conservative estimates of the risks, if any, posed by residual chemicals in soil gas at the site.

6.4 Data Quality Assessment

Data quality assessment (DQA) is an analysis that is performed after the risk assessment to determine whether enough data have been collected to support the risk-based decisions that are being supported by the risk assessment. Sample-size calculations were conducted for carbon tetrachloride, naphthalene, and tetrachloroethene. The formula used for calculation of sample

size is based on a non-parametric test (the Wilcoxon signed rank test), and on simulation studies performed by Pacific Northwest National Laboratories (PNNL, 2001). Essentially, the formula is the one that would be used if a normal-based test (such as a standard t-test) were being performed, but an adjustment is made (multiplier of 1.16) to account for the intent to perform a non-parametric test. The formula is as follows:

$$n = 1.16\left[\frac{s^2}{\Delta^2}(z_{1-\alpha} + z_{1-\beta(\mu)})^2 + 0.5z_{1-\alpha}^2\right]$$

where:

n	=	number of samples
s	=	estimated standard deviation of concentrations/fibers
Δ	=	width of the gray region (the difference between the threshold value stated in the null hypothesis and the point at which β is specified)
α	=	significance level or Type I error tolerance
β (μ)	=	Type II error tolerance
z	=	quantile from the standard normal distribution

For each chemical, inputs for the calculations include an estimate of the variance from the measured data, a desired significance level, and desired power of the test. The power of the test must be specified at a concentration of interest (which determines the tolerable difference from the threshold value), based on the SGSSLs. The calculations provided in Table 10 cover a range of significance (α) and power (1-β) levels, including the most commonly used 0.05 significance level and 80% power. Table 11 shows the minimum sample size necessary to detect a 10%, 20% or 30% difference from the threshold value for each combination of significance and power level.

As shown in Table 11, there is sufficient sample size for naphthalene and tetrachloroethene to detect a 10% difference at a 0.05 significance level with 85% power (1-β). The same conclusion can be drawn for carbon tetrachloride, except with 75% power; the available sample size (n=95) exceeds the necessary sample size for all other parameters. It should be noted that chloroform, which is the primary contributor to overall risks at the majority of sampling locations, was not included in the DQA because the measured soil gas concentrations were well in excess of the SGSSL at multiple locations and the extreme variability in detected concentrations skews this

type of analysis. Nevertheless, the 95 soil gas sample locations are considered sufficient support the results of this HRA because the primary source of chloroform in soil gas is believed to be shallow groundwater and the distribution of chloroform in shallow groundwater has been delineated.

7.0 CONCLUSIONS

The objective of the site-wide soil gas HRA was to evaluate the potential for adverse health impacts that may occur as a result of potential exposure to chemicals in soil gas via inhalation of vapors in indoor or outdoor air.

Soil gas data collected as part of the Phase B Source Area Investigation Soil Gas Survey were evaluated and considered useable for purposes of this HRA. All data were reviewed and data usability requirements were met for purposes of conducting the HRA. COPCs were selected according to a multi-step process, including a toxicity screen, frequency of detection, and CSM considerations. Based on this process, eight chemicals (benzene, bromodichloromethane, carbon tetrachloride, chloroform, hexachlorobutadiene, naphthalene, tetrachloroethene, and TCE) were selected as COPCs. Cumulative cancer risks and hazard index values were estimated on a sample-by-sample basis and 1×10^{-6} and 1×10^{-5} risk isopleths were generated (no total excess cancer risk estimates exceeded 1×10^{-4}). The results of the HRA can be summarized as follows:

Site –Wide Findings

- For an indoor commercial worker, the excess cancer risks due to exposure to chemicals in soil gas range from 2×10^{-9} (SG94, located in RZ-C) to 1×10^{-4} (SG32, also located in RZ-C). Chloroform is the largest contributor to the overall risk (up to >99%) at the majority of locations, with individual chemical risk estimates ranging from 5×10^{-10} to 1×10^{-4}. Carbon tetrachloride is another significant contributor to the overall risk (up to 43%) at some locations, with individual chemical risk estimates ranging from 2×10^{-11} to 3×10^{-6}. None of the other COPCs had overall risk estimates greater than 1×10^{-6}.
- The estimated non-cancer hazard quotients and hazard indices associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 0.00001 to 0.1. All of these values are well below 1, indicating that potential exposure to COPCs in soil gas through inhalation of vapors by an indoor commercial worker should not pose an unacceptable non-carcinogenic health risk under the conditions evaluated.. Chloroform is the largest contributor to the overall hazard index at most sampling locations. Other significant contributors to the overall hazard index at some locations include carbon tetrachloride, naphthalene, and tetrachloroethene.
- The estimated excess cancer risks associated with exposure of an outdoor commercial worker to the COPCs in soil gas through inhalation of vapors in outdoor air range from 5×10^{-12} to 1×10^{-6} and the non-cancer hazard indices range from 7×10^{-9} to 0.001. These values indicate that potential exposure to COPCs in soil gas through inhalation of vapors

by an outdoor commercial worker should not pose an unacceptable carcinogenic or non-carcinogenic health risk under the conditions evaluated. Chloroform was the largest contributor to the overall excess cancer risks and non-cancer hazard indices.

Area-Specific Findings

The designation of the RZs was primarily based on soil investigation findings, which may not be the most appropriate basis for designating soil gas exposure areas. Nevertheless, risk estimates were provided for RZ-A through RZ-E as well as the adjacent parcels.

- For RZ-A and all the parcels, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air are at or below 1×10^{-6} and hazard index values are well below 1.
- For RZ-B, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 5×10^{-9} to 9×10^{-5}, with the highest risk estimates near Unit Buildings 3 and 4 in the east-central portion of RZ-B. The area of higher estimated risks is consistent with higher chloroform concentrations in shallow groundwater in this area of the site.
- For RZ-C, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 2×10^{-9} to 1×10^{-4}, with the highest risk estimates clustered along the western property boundary and in the east-central portion of the site, areas that coincide with elevated concentrations of chloroform and carbon tetrachloride in shallow groundwater.
- For RZ-D, the estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air range from 5×10^{-8} to 2×10^{-5}, with the highest risk estimates clustered along the western property boundary, which again coincides with elevated concentrations of chloroform in shallow groundwater.
- For RZ-E, there are only two soil gas sampling locations and the total excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air at both of these locations is 3×10^{-6}.

There are multiple sources of uncertainty associated with the HRA results, particularly regarding model predictions of indoor air concentrations as a result of vapor intrusion. Site-specific data were used when possible to reduce uncertainty. There is relatively little guidance on appropriate values for two parameters, i.e., air exchange rate and vapor flow rate into commercial buildings.

The above results are based on conservative (i.e., heath-protective) assumptions for these two parameters. If less conservative, but still reasonable, assumptions are used, the estimated excess cancer risks and non-cancer hazard indices are a factor of four lower (i.e., on a site-wide basis, excess cancer risks range from 6×10^{-10} to 3×10^{-5}). Although there are still areas of the Site where the estimated risks exceed 1×10^{-6}, the size of those areas is substantially smaller when more reasonable assumptions are incorporated.

Carbon tetrachloride, naphthalene, and tetrachloroethene were included in the DQA, which indicates that a sufficient number of soil gas samples were collected to support the results of this HRA. Chloroform was not included in the DQA; however, the 95 soil gas sample locations are considered sufficient because the primary source of chloroform in soil gas is believed to be shallow groundwater and the distribution of chloroform in shallow groundwater has been delineated. Findings from this site-wide soil gas HRA will be incorporated into the RZ and parcel-specific risk assessments, as appropriate, to allow for risk management decisions.

8.0 REFERENCES

AECOM, Inc. (AECOM). 2008. *Revised Phase B Site Investigation Work Plan for Areas I, II, III and IV, Text, Tables and Figures.* Tronox LLC Facility. Henderson, Nevada. December 2008.

American Society for Testing and Materials (ASTM). 2000. Standard Guide for Risk-Based Corrective Action. E2081-00.

Agency for Toxic Substances Disease Registry (ATSDR). 1997a. Toxicological Profile for Chloroform.

Agency for Toxic Substances Disease Registry (ATSDR). 1997b. Toxicological Profile for Tetrachloroethene.

California Environmental Protection Agency (Cal-EPA). 2005. Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air. California Environmental Protection Agency, Department of Toxic Substances Control, Sacramento, CA.

Ecology and Environment. 1982. Summary and Interpretation of Environmental Quality Data, BMI Industrial Complex, Henderson, Nevada. November.

ENSR Corporation (ENSR). 2005. Conceptual Site Model (CSM). Kerr-McGee Facility, Henderson, Nevada. February.

ENSR Corporation (ENSR) 2007, Phase A Source Area Investigation Results Report, Tronox LLC Facility, Henderson, Nevada, September.

ENSR Corporation (ENSR). 2008a. Phase B Source Area Investigation Work Plan – Soil Gas Survey. Tronox LLC Facility, Henderson, Nevada. March.

ENSR Corporation (ENSR). 2008b. Revised Draft Data Validation Summary Report, Phase B Source Area Investigation Soil Gas Survey, Tronox LLC Facility, Henderson, Nevada, October.

ENSR Corporation (ENSR). 2008c. Quality Assurance Project Plan, Tronox LLC Facility, Henderson, Nevada.

ERM and MWH. 2007. Basic Remediation Company (BRC) Field Sampling and Standard Operating Procedures, BMI Common Areas. August.

Hargis + Associates. 2008. Technical Memorandum, 2007 Vapor Intrusion Groundwater Monitoring Results. February.

Interstate Technology Regulatory Council (ITRC). 2007. Technical and Regulatory Guidance – Vapor Intrusion Pathway: A Practical Guideline.

Johnson, P.C., and R.A. Ettinger. 1991. Heuristic model for predicting the intrusion rate of contaminant vapors in buildings. Environ. Sci. Technol. 25:1445-1452.

Michigan Environmental Science Board. 2001. Evaluation of the Michigan Department of Environmental Quality's Generic Groundwater and Soil Volatilization to Indoor Air Inhalation Criteria. (A Science Report to Governor John Engler). Michigan Environmental Science Board, Lansing, MI.

Nevada Division of Environmental Protection (NDEP). 1996. Nevada Administrative Code Chapter NAC 445A. Adopted Permanent Regulation of the Nevada State Environmental Commission. LCB File No. R119-96.

Nevada Division of Environmental Protection (NDEP). 2006. Guidance on Data Validation, BMI Plant sites and Common Areas Projects, Henderson, Nevada.

Nevada Division of Environmental Protection (NDEP). 2008a. *BMI Plant Sites and Common Areas Projects, Henderson, Nevada: Statistical Analysis Recommendations for Field Duplicates and Field Splits.* Bureau of Corrective Actions, Special Projects Branch, 2030 East Flamingo Rd, Suite 230, Las Vegas, NV 89119. November 14.

Nevada Division of Environmental Protection (NDEP). 2008b. Guidance on the Development of Summary Statistic Tables at the BMI Complex and Common Areas in Henderson, Nevada. Bureau of Corrective Actions, Special Projects Branch, 2030 East Flamingo Rd, Suite 230, Las Vegas, NV 89119. December 10.

Nevada Division of Environmental Protection (NDEP). 2009. User's Guide and Background Technical Document for Nevada Division of Environmental Protection (NDEP) Basic Comparison Levels (BCLs) for Human Health for the BMI Complex and Common Areas. Revision 4-November.

Nevada Division of Environmental Protection (NDEP). 2010a. September 2010 Revised Data Usability Guidance, BMI Plant Sites and Common Areas Projects, Henderson, Nevada. September 1.

Nevada Division of Environmental Protection (NDEP). 2010b. Letter to Mr. Matt Paque, Tronox LLC, from Ms. Shannon Harbour, regarding NDEP Response to: *Revised Technical Memorandum: Screening-Level Indoor Air Health Assessment for the 2008 Tronox Parcels A/B Soil Gas Investigation, Tronox LLC, Henderson, Nevada*, dated June 29, 2010, and *Errata to Revised Technical Memorandum: Screening-Level Indoor Air Health Assessment for the 2008 Tronox Parcels A/B Soil Gas Investigation, Tronox LLC, Henderson, Nevada: NDEP Facility ID # 000539.* August 31.

Northgate Environmental Management, Inc. (Northgate). 2010a. Health Risk Assessment Work Plan, Tronox Facility, Henderson, Nevada, March 2010.

Northgate Environmental Management, Inc. (Northgate). 2010b. Spring 2010 Indoor Air Quality Sampling and Analysis Report, Tronox LLC, Henderson, Nevada. September 22.

NRC. 1998. Chemical Mixtures. National Research Council, National Academy Press, Washington, DC.

Pacific Northwest National Laboratories (PNNL). 2001. Visual Sample Plan (VSP) Models and Code Verification. PNNL-13450. Prepared by R. O. Gilbert, J. R. Davidson, Jr., J. E. Wilson, B. A. Pulsipher. Prepared for the U.S. Department of Energy under Contract DE-AC06-76RL01830. February 2001

Risk Commission. 1997. Final report, Volume 2, Risk management in regulatory decision-making. Presidential/Congressional Commission of Risk Assessment and Risk Management, Washington, DC.

Seed, J., R.P. Brown, S.S. Olin, and J.A. Foran. 1995. Chemical mixtures: Current risk assessment methodologies and future directions. Regulatory Toxicol. Pharmacol. 22:76–94.

U.S. Environmental Protection Agency (U.S. EPA). 1986a. Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum, Washington D.C. EPA/630/R-00/004. September

U.S. Environmental Protection Agency (U.S. EPA). 1986b. Guidelines for health risk assessment of chemical mixtures. U.S. Environmental Protection Agency, Federal Register 51(185):34104–34025.

U.S. Environmental Protection Agency (U.S. EPA). 1989. Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. U.S. EPA/540/1-89/002. December.

U.S. Environmental Protection Agency (U.S. EPA). 1990. National Oil and Hazardous Substances Pollution Contingency Plan. U.S. Environmental Protection Agency, Federal Register 55:8666.

U.S. Environmental Protection Agency (U.S. EPA). 1992a. Guidelines for Exposure Assessment. Federal Register, 57(104):22888-22938. May 29.

U.S. Environmental Protection Agency (U.S. EPA). 1992b. Guidance for Data Usability in Risk Assessment. Part A. Office of Emergency and Remedial Response, Washington D.C. Publication 9285.7-09A. PB92-963356. April.

U.S. Environmental Protection Agency (U.S. EPA). 1992c. Guidance for Data Usability in Risk Assessment. Part B. Office of Emergency and Remedial Response, Washington D.C. Publication 9285.7-09B. PB92-963362. May.

U.S. Environmental Protection Agency (U.S. EPA). 1996. Proposed Guidelines for Carcinogen Risk Assessment. Office of Research and Development, Washington D.C. EPA/600/P-92/003C. April.

U.S. Environmental Protection Agency (U.S. EPA). 1997. Exposure Factors Handbook. Office of Research and Development, Washington DC. U.S. EPA/600/P-95/002Fa-c. August.

U.S. Environmental Protection Agency (U.S. EPA). 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response, Washington, DC. OSWER 9355.4-24. December.

U.S. Environmental Protection Agency (U.S. EPA). 2003. Memorandum on Human Health Toxicity Values in Superfund Risk Assessments, from Michael B. Cook, Director, Office of Superfund Remediation and Technology Innovation to Superfund Remediation Policy Managers, Regions 1 - 10, dated 5 December. OSWER Directive 9285.7-53.

U.S. Environmental Protection Agency (U.S. EPA). 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Prepared by Environmental Quality Management, Inc. for the U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington DC. February 22.

U.S. Environmental Protection Agency (U.S. EPA). 2009. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) Final. EPA-540-R-070-002. January.

U.S. Environmental Protection Agency (U.S. EPA). 2010a. Regional Screening Level Table – User's Guide. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm. Accessed August 31.

U.S. Environmental Protection Agency (U.S. EPA). 2010b. Integrated Risk Information System. U.S. EPA on-line database: http://www.epa.gov/iris/index.html. Accessed August-November.

Closure and Post-Remediation Screening Health Risk Assessment Report for Parcels C, D, F, G, and H
Tronox LLC
Henderson, Nevada

December 10, 2010

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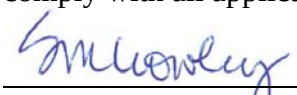
Closure and Post-Remediation Screening Health Risk Assessment Report
Parcels C, D, F, G, and H
Tronox LLC
Henderson, Nevada

Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.



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ACRONYM LIST

Acronym	Meaning
ADD	Average daily dose
BCL	Basic comparison level
Bgs	Below ground surface
BEC	Basic Environmental Company
BRC	Basic Remediation Company
CLP	Contact Laboratory Program
COPC	Chemical of potential concern
CSM	Conceptual site model
DAF	Dilution attenuation factor
DQI	Data quality indicator
DQO	Data quality objective
DVSR	Data validation summary report
EC	Exposure concentration
ECD	Electron capture detector
ED	Exposure duration
ECAO	Environmental Criteria And Assessment Office
EDA	Exploratory data analysis
EPC	Exposure-point concentration
GC	Gas chromatograph
GISdT®	Guided Interactive Statistical Decision Tool
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HRA	Human Health Risk Assessment
IUPAC	International Union of Pure and Applied Chemicals
LADD	Lifetime average daily dose
LBCL	Leaching Basic Comparison Level
LOU	Letter of Understanding
LSSL	Leaching-Based Site-Specific Levels
LVP	Las Vegas Paving
MS	Mass spectrometer
MSD	Matrix spike duplicate
NCEA	National Center for Environmental Assessment
NDEP	Nevada Division of Environmental Protection
OCP	Organochlorine pesticide
PAH	Polynuclear aromatic hydrocarbon
PARCC	Precision, accuracy, representativeness, comparability, and completeness
PCB	Polychlorinated biphenyls
PEF	Particulate emission factor
PPRTV	Provisional peer-reviewed toxicity value
PQL	Practical quantitation limit
QA/QC	Quality assurance/quality control

Acronym	Meaning
QAPP	Quality Assurance Project Plan
RfC	Reference concentration
RfD	Reference dose
RME	Reasonable maximum exposure
RPD	Relative percent difference
RZ-A	Remediation Zone A
SF	Slope factor
SOP	Standard operating procedure
SQL	Sample quantitation limit
SRC	Site-related chemical
SVOC	Semi-volatile organic compound
SWP	Soil-water partitioning
TEF	Toxicity equivalency factor
TEQ	Toxicity equivalency
TPH	Total petroleum hydrocarbon
U	Qualified
UCL	Upper confidence limit
URF	Unit risk factor
U.S. EPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

EXECUTIVE SUMMARY

On behalf of Tronox LLC (Tronox), Northgate Environmental Management, Inc. (Northgate) and Exponent, Inc. (Exponent) have prepared this Closure and Post-Remediation Human Health Risk Assessment (HRA) Report for Parcels C, D, F, G, and H (Parcels) at the Tronox facility in Henderson, Nevada (the Site). These parcels represent a subset of the original parcels A through J. It should be recognized that these parcels do not correspond to Clark County assessor parcel designations.

Analytical results for confirmation soil samples indicate that Parcels C, D, F, G, and H have been successfully remediated consistent with the remediation goals established by the approved Remedial Action Workplan (BEC, 2008a) and the Nevada Division of Environmental Protection (NDEP) with a few exceptions as described in this document. These data demonstrate that the Parcels have been remediated to commercial/industrial standards.

A post-remediation HRA was conducted to evaluate the residual soil and soil-gas chemical concentrations in the Parcels. Soil concentrations were also evaluated for the soil to groundwater pathway. Soil data collected as part of the initial and confirmation sampling efforts were evaluated and considered usable for the purposes of this HRA. The methods and findings from the HRA can be summarized as follows:

<u>Direct Soil Contact</u>

- Based on the Conceptual Site Model (CSM) for the Parcels, potential exposure to soil was evaluated for future onsite indoor and outdoor commercial workers and future construction workers via direct contact with soil (i.e., incidental ingestion, dermal contact, and inhalation of dust). Chemicals of potential concern (COPCs) were selected according to a multi-step process, including comparisons to background for metals and radionuclides, a toxicity screen, frequency of detection, and CSM considerations. Based on this process, 14 chemicals were selected as COPCs.
- Non-cancer hazard indexes and/or theoretical excess cancer risks associated with direct contact with soil were estimated for all of the COPCs except asbestos, based on the maximum detected concentration. The estimated hazard indices and excess cancer risks were equal to or below NDEP's point of departure for non-cancer effects (hazard index of 1) and cancer risks (1×10^{-6}) for future onsite indoor and outdoor commercial workers and future construction workers under the conditions evaluated.
- With regard to asbestos, a best estimate and an upper-bound estimate were calculated. The estimated risks for death from lung cancer or mesothelioma for asbestos exposures to

future onsite outdoor commercial workers and construction workers are less than or equal to 1×10^{-6}, except for upper-bound estimates of exposure to amphibole fibers by future construction workers.

- Additional confirmation samples were collected for polynuclear aromatic hydrocarbons (PAHs) in Parcel F. PAHs were not detected in these samples at detection limits below the basic comparison levels (BCLs). Therefore, inclusion of these data in the risk assessment calculations will not affect the results of this post-remediation HRA.

The results indicate that direct contact with residual chemicals in soil in the Parcels should not result in unacceptable risks for all future onsite receptors.

Soil to Groundwater Leaching

Only two chemicals, alpha-BHC and beta-BHC, were detected at concentrations above their respective leaching-based site-specific levels (LSSLs); however, there is no indication of wide-spread soil contamination that would lead to groundwater impacts based on the relatively few detections of these compounds in the Parcels soil. A leaching basic comparison level (LBCL) is not available for perchlorate; however, this chemical is being addressed as part of the Site-wide groundwater and vadose zone evaluation.

Soil Gas

Soil gas samples collected in the Parcels were evaluated as part of the Site-Wide Soil Gas Risk Assessment (Northgate, 2010b). COPCs in soil gas were selected according to a multi-step process, including a toxicity screen, frequency of detection, and CSM considerations. Based on this process, eight chemicals (benzene, bromodichloromethane, carbon tetrachloride, chloroform, hexachlorobutadiene, naphthalene, tetrachloroethene, and trichloroethene) were selected as COPCs. Excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air at the Parcels are at or below 1×10^{-6}, and hazard index values are well below 1. Based on findings reported in the Site-Wide Soil Gas Risk Assessment, inhalation of vapors in indoor air should not result in unacceptable risks to future indoor commercial workers.

1.0 INTRODUCTION

On behalf of Tronox, Northgate and Exponent have prepared this Closure and Post-Remediation Human HRA Report for Parcels C, D, F, G, and H (Parcels) at the Tronox facility in Henderson, Nevada (the Site). These Parcels represent a subset of the original Parcels A through J. It should be recognized that these parcels do not correspond to Clark County assessor parcel designations.

This report presents field activities related to soil remediation and asbestos abatement conducted in the Parcels, a post-remediation risk assessment that was performed to evaluate potential human health risks associated with residual concentrations of chemicals in soil following remediation, and supporting tables, figures, and appendices.

The remedial actions described in this report are based on information contained in the following documents:

- *Removal Action Workplan for Soil, Tronox Parcels "C", "D", "F", "G", and "H" Sites, Henderson, Nevada* (RAW), prepared by Basic Environmental Company (BEC), dated July 1, 2008 (BEC, 2008a);
- Nevada Division of Environmental Protection (NDEP) July 2, 2008, approval letter of *Removal Action Workplan for Soil, Tronox Parcels "C", "D", "F", "G", and "H" Sites, Henderson, Nevada* dated July 1, 2008, with comments, and July 2, 2008, e-mail correspondence between Shannon Harbour of NDEP and Susan Crowley of Tronox regarding NDEP comment clarifications (NDEP, 2008a);
- *Data Validation Summary Report, Tronox Parcels C, D, F, and G Investigation, November 2007, BMI Industrial Complex, Clark County, Nevada,* prepared by ERM-West, Inc., and dated February 2008 (ERM-West, 2008a);
- *Data Validation Summary Report, Tronox Parcel H Investigation, January 2008, BMI Industrial Complex, Clark County, Nevada,* prepared by ERM-West, Inc., and dated April 2008 (ERM-West 2008b);
- *Data Validation Summary Report, Tronox Parcels C, D, F, G and H Supplemental Investigations-June-July 2008, BMI Industrial Complex, Clark County, Nevada,* prepared by ERM-West, Inc., and dated January 2009 (ERM-West, 2009); and
- *Data Validation Summary Report, Parcels "C", "D", "F", "G", and "H" Soil Confirmation, Tronox LLC, Henderson, Nevada,* prepared by Northgate, dated June 15, 2010 (Northgate, 2010a).

1.1 Scope of Report

The purpose of this report is twofold: 1) to describe the field activities related to implementing the RAW for soil in the Parcels, including the scraping and removal of asbestos- and chemically-impacted soils within the Parcels; and 2) present a post-remediation HRA based on the initial and confirmation Parcel soil data.

The objective of the post-remediation HRA is to evaluate the potential for adverse human health impacts that may occur as result of exposure to soil in the Parcels that contains residual concentrations of chemicals. The findings of this report are intended to support the site closure process. Potential exposure to residual chemicals in soil vapor in the Parcels was evaluated as part of the Site-Wide Soil Gas Human Health Risk Assessment (Northgate 2010b), and the soil-gas findings with regard to the Parcels are summarized in this report. This document also evaluates potential for leaching from soil to groundwater. Issues related to affected groundwater beneath the Parcels are being addressed on a Site-wide basis and are being presented in separate stand-alone report; therefore, groundwater is not evaluated in this report.

The overall goal of this report is to demonstrate that soil within the Parcels has been remediated in a manner consistent with the cleanup strategy presented in the RAW (BEC, 2008a), and that under a future commercial/industrial land-use scenario, there is no significant risk to human health associated with the Site.

1.2 Report Organization

This closure and HRA report is organized as follows:

- Section 2.0 describes past uses of the Parcels and results of BEC's Phase 2 soil sampling.
- Section 3.0 describes Northgate's field activities related to the scraping and removal of soil in the Parcels, including summaries of soil volumes removed and disposed. The confirmation soil sampling program conducted within the Parcels after completion of removal activities is also discussed.
- Section 4.0 presents the sources of the analytical data used in the post-remediation HRA, and procedures used to evaluate the data.
- Section 5.0 presents the post-remediation HRA and includes the conceptual site model (CSM), selection of chemicals of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization.
- Section 6.0 presents an overall summary and conclusions regarding the current conditions at the Parcels.

- Section 7.0 provides references for documents cited in this report.

Supporting tables, figures, and appendices follow the text of this report.

2.0 TRONOX SITE DESCRIPTION AND HISTORY

The approximately 450-acre site, of which the Parcels constitute approximately 83.4 acres, is located approximately 13 miles southeast of the city of Las Vegas in an unincorporated area of Clark County, Nevada, and lies in Sections 1, 12, and 13 of Township 22 S, Range 62 E, (Figure 1). The site is located within the Black Mountain Industrial (BMI) complex, which consists of several facilities, owned and operated by chemical companies, one of which is Tronox. The City of Henderson surrounds the BMI complex, which is an unincorporated Clark County "island."

Early in Tronox's site history, the Parcels were identified as areas that were either generally undeveloped and/or not significantly chemically-impacted by previous uses. Parcel boundaries are shown on Figure 2.

The BMI complex was first developed by the U.S. government in 1942 as a magnesium plant for World War II operations. Later, a part of the BMI complex was leased by Western Electrochemical Company (WECCO), which would ultimately become the Tronox Site. WECCO produced manganese dioxide, sodium chlorate, sodium perchlorate, and other perchlorates. WECCO also produced ammonium perchlorate (a powerful oxidizer) for the Navy during the early 1950s, using a plant that was constructed on the Site by the Navy. WECCO merged with American Potash and Chemical Company (AP&CC) in 1956, and continued production of ammonium perchlorate for the Navy. In 1967, AP&CC merged with Kerr-McGee Corporation (Kerr-McGee) and added production of boron chemicals in the early 1970s. The production processes included elemental boron, boron trichloride (a colorless gas used as a reagent in organic synthesis), and boron tribromide (a colorless fuming liquid compound used in a variety of applications). The production of boron tribromide was discontinued in 1994, and the production of sodium chlorate and ammonium perchlorate was discontinued in 1997 and 1998, respectively. Perchlorate was reclaimed at the Site using existing equipment until early 2002.

In 2005, Kerr-McGee Chemical LLC was renamed Tronox LLC. Tronox's Henderson facility continues to produce electrolytic manganese dioxide, used in the manufacture of alkaline batteries; elemental boron, a component of automotive airbag igniters; and boron trichloride, used in the pharmaceutical and semiconductor industries and in the manufacture of high-strength boron fibers for products that include sporting equipment and aircraft parts.

During the 1970s, the U.S. Environmental Protection Agency (U.S. EPA), the State of Nevada, and Clark County investigated potential environmental impacts from the BMI companies' operations, including atmospheric emissions, groundwater and surface-water discharges, and soil impacts (Ecology and Environment, 1982). From 1971 to 1976, Kerr-McGee modified its

manufacturing process and constructed lined surface impoundments to recycle and evaporate industrial wastewater. In 1976, the facility achieved zero discharge status regarding industrial wastewater management. In 1980, the U.S. EPA requested specific information from the BMI companies regarding their manufacturing and waste management practices by issuing Section 308 letters. In 1993, a Phase I site assessment was completed for the Site and approved by NDEP. In 1994, NDEP issued a Letter of Understanding (LOU) to Kerr-McGee that identified 69 specific areas or items of interest and indicated the level of environmental investigation they wanted Kerr-McGee to conduct. In 1996, Kerr-McGee completed a Phase II site assessment, which included field sampling as described in an NDEP approved Phase II Work Plan.

Tronox has continued to undertake environmental investigations to assess environmental conditions at the Henderson facility. A detailed discussion of the specific areas or items of interest identified in the LOU, and a list of the products made, years of production, and approximate waste volumes for WECCO, AP&CC, and Tronox are found in the *Conceptual Site Model (CSM) Report* (ENSR, 2005).

Background information, including local geology, hydrogeology, and wind direction, is also described in the *Conceptual Site Model (CSM) Report* (ENSR 2005). In general, groundwater is encountered in the fine-grained facies within the uppermost Muddy Creek Formation. The depth to groundwater ranges from about 27 to 80 ft bgs and is generally deepest in the southernmost portion of the Site (where Parcel H is located). The prevailing wind direction for the Site is from the Southwest and the South or West with the Olin property located up-wind (west) and the TIMET property located down-wind (east) from the Site (see Figure 1 for wind-rose). Based on the prevailing wind direction, the nearest down-wind residences are located approximately 1800 feet from Parcel D, which is the northern-most parcel included in this report.

2.1 Historical Uses and Results of Investigations of Parcels C, D, F, G, and H

Northgate compiled information regarding historical usage and investigations of the Parcels from the following sources:

- *Environmental Conditions Assessment, Kerr-McGee Chemical Corporation, Henderson, Nevada Facility*, prepared by Kleinfelder, and dated April 1993 (Kleinfelder, 1993);
- *Removal Action Workplan for Soil, Tronox Parcels "C", "D", "F", "G" and "H" Sites, Henderson, Nevada* (RAW), prepared by Basic Environmental Company (BEC), and dated July 1, 2008 (BEC, 2008a);

- Revised Phase B Site Investigation Work Plan for Areas I, II, III and IV, Text, Tables and Figures, prepared by AECOM, dated December 2008, and containing summaries for 70 LOUs (sites identified in an August 15, 1994 Letter of Understanding); and
- *Phase I Environmental Site Assessment [ESA], Approximately 182 Acres, APNs 178-13-601-002,-002, 178-12-101-002, -003, 178-12-201-005, 178-12-601-005, 178-01-401-001, 178-11-501-007, and Portions of 178-12-401-009 & 178-13-101-002, Henderson, Nevada*, prepared by Converse Consultants (Converse), and dated March 5, 2007 (Converse, 2007).

In addition, Northgate created a map that consists of the Parcel location map overlain with the LOU locations. The resultant map (Figure 2) was reviewed to determine which LOUs were identified in each of the five Parcels. No LOUs are located in Parcels C, D, and H. LOUs 63 and 65c are located in Parcel F; and LOU 65d is located in Parcel G. Descriptions of these LOUs are included in Sections 2.1.2 and 2.1.3, respectively.

On behalf of BEC, ERM-West conducted soil sampling in Parcels C, D, F, and G in August and September 2007 (data validation summary report [DVSR] dated February 2008 [ERM-West, 2008a]) and in Parcel H during January and March 2008 (DVSR dated April 2008 [ERM-West, 2008b]) in accordance with the *Phase 2 Sampling and Analysis Plan to Conduct Soil Characterization* (BEC, 2007). The initial investigation data summaries and risk tables were presented by BEC and discussed with NDEP and Tronox on May 15, 2008 (NDEP, 2008b). Based on the findings discussed during the meeting, a supplemental investigation was conducted in Parcels C, D, F, G, and H in June and July 2008, in accordance with the Sampling and Analysis Plan (SAP; BEC, 2008b), and results were reported in the DVSR dated January 2009 (ERM-West, 2009). BEC prepared a RAW for the Parcels that proposed remediation polygons in each of the Parcels (BEC, 2008a). The RAW was approved by NDEP on July 2, 2008 (NDEP, 2008a), and served as the basis for Northgate's 2010 remediation of the Parcels.

Asbestos remediation goals for the Parcels were established by NDEP as four or more long chrysotile fibers and one or more long amphibole fibers (>10 microns [µm] in length and <0.4 µm in width). The Agency for Toxic Substances and Disease Registry (ATSDR) action level of one part per billion was used as a remediation goal for dioxins and furans. For all other chemicals, the NDEP Basic Comparison Levels (BCLs) for the Industrial/Commercial worker, which are based on an incremental lifetime cancer risk of one in one million (1×10^{-6}) or a non-cancer hazard index of 1, were used as the remediation goals (BEC, 2008a).

2.1.1 Parcel C and D Historical Use and Investigation

Historical use of Parcels C and D has been limited, based on review of historical aerial photographs and reports of past activities. No LOUs are located in Parcels C and D (Figure 3). Parcel C is a 20.4-acre parcel located directly north and adjacent to the former Trade Effluent Ponds. Review of aerial photographs indicates that sometime prior to 1950, multiple ditches lined with French drains were installed across Parcel C, perpendicular to, and leading from, a main French drain that traversed east-west along the northern berm of the ponds located along the southern boundary of Parcel C. The drains were ostensibly used for capturing underflow from the former Trade Effluent Ponds. At some point, these ditches were disturbed and possibly graded over.

Parcel D is a 24.6-acre parcel located directly north of Parcel C, and based on review of historical aerial photographs, the ditches (French drains) described for Parcel C extended into and terminated in the eastern two-thirds of Parcel D. According to the BEC (2008a) RAW, Phase 2 soil sampling performed in Parcels C and D indicated the presence of long amphibole fibers and long chrysotile fibers exceeding remediation goals at four locations (samples TSB-CR-02, TSB-CR-03, and TSB-CJ-03 in Parcel C, and TSB-DR-04 in Parcel D), and dioxins/furans in sample TSB-CR-07 located in Parcel C (Figure 3).

BEC developed Thiessen/Voronoi polygons for Parcels C and D. The single polygon located in Parcel D was an exception to the rule, because it was located in a drainage ditch. BEC based the dimensions of this polygon on the fact that two subsequent soil samples collected east and west of TSB-DR-04 (TSB-DR-04E and TSB-DR-04W) were found to be "clean." These polygons were the basis for Northgate's remedial design for Parcels C and D (Figure 3). Northgate's remedial activities are described in Section 3.2.

2.1.2 Parcel F Historical Use and Investigation

LOUs 63 and 65c are located in Parcel F. Parcel F is a 7.2-acre parcel that was initially leased by W.S. Hatch Company, a trucking operation, from 1980 to 1986. Jack B. Kelley, Inc. (J.B. Kelley) leased Parcel F from 1986 through at least 1993 and also operated a trucking operation (Kleinfelder, 1993). The company hauled commodities such as lime and soda ash. The areas of interest at the J.B. Kelley site included a 10,000-gallon fiberglass diesel underground storage tank (UST), a ceramic-lined 600-gallon waste-oil UST, and truck washing in eight open concrete vaults that formerly served as foundations for peat storage buildings during World War II. Rinsate from truck washing was reportedly discharged to possibly the former vault floors, metal containment tanks, a storm sewer, and/or the ground surface. Additional fluids from truck

maintenance activities, such as oil changes, were reportedly discharged to the storm sewer, which conveyed the wash water and other fluids northward to the Beta Ditch (Kleinfelder, 1993).

Chemicals reported in tanker-truck rinsate consisted of lime, soda ash, barite, magnesium chloride brine, and possibly dilute concentrations of ferric chloride, hydrochloride, sodium hydro sulfide, sodium hydroxide, and titanium tetrachloride. Onsite wash activities ceased in 1991. JB Kelley, Inc. retained consultants to conduct field investigations of the diesel UST and 600-gallon ceramic-lined waste-oil UST. Both tanks were found to have leaked, and were removed in 1991. Contaminated soil in the tank pits was reportedly excavated at the time of tank removal (Kleinfelder, 1993).

According to the Converse (2007) Phase 1 Site Assessment, a Phase I ESA was conducted for Parcel F by Tetra Tech EM, Inc. (Tetra Tech), in October of 2005, on behalf of TIMET. The Tetra Tech ESA reportedly found three Recognized Environmental Conditions (RECs) in Parcel F: an empty steel tank, three 55-gallon drums, and a painted surface on the interior of a building. No additional information was reported by Converse regarding these RECs (Converse, 2007).

LOU 65c was formerly occupied by Nevada Pre-Cast Concrete, which used office space near the J.B. Kelley operations from January 1973 to May 1978. Reportedly, only office activities were conducted by Nevada Pre-Cast Concrete (Kleinfelder, 1993). No waste streams or chemical uses have been associated with LOU 65c.

Soil quality investigations have been performed to characterize Parcel F. According to the BEC (2008a) RAW, Phase 2 soil sampling performed in Parcel F indicated the presence of long amphibole fibers and long chrysotile fibers exceeding remediation goals at eight locations in Parcel F (TSB-FJ-01, TSB-FJ-02, TSB-FR-02, TSBFJ-03, TSB-FJ-05, TSB-FJ-06, TSB-FJ-07, and TSB-FJ-08). In addition, Aroclor 1254, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene at TSB-FR-02, and arsenic at TSB-FJ-02 were detected above BCLs (Figure 4).

BEC developed Thiessen/Voronoi polygons for Parcel F. These polygons were the basis for Northgate's remedial design for Parcel F (Figure 4). Northgate's remedial activities are described in Section 3.3.

2.1.3 Parcel G Historical Use and Investigation

Only one LOU—LOU 65d—is located in Parcel G (5.2-acre parcel). Green Ventures International leased a building ("S3 Changehouse") from August 1980 to September 1981 for

use as a marketing office by a Green farming operation. Only office activities were conducted by Green Ventures International (Kleinfelder, 1993). No waste streams or chemical uses have been associated with LOU 65d.

Soil quality investigations have been performed to characterize Parcel G. According to the BEC (2008a) RAW, Phase 2 soil sampling performed in Parcel G indicated the presence of long amphibole fibers exceeding the remediation goal at two locations (TSB-GJ-04 and TSB-GJ-09) and benzo(a)pyrene above its BCL at TSB-GJ-06 (Figure 5).

BEC developed Thiessen/Voronoi polygons for Parcel G. These polygons are the basis for Northgate's remedial design for Parcel G (Figure 5). Northgate's remedial activities are described in Section 3.4.

2.1.4 Parcel H Historical Use and Investigation

Review of historical aerial photographs from 1950 through 2006 of Parcel H (26-acre parcel) indicates that the property has remained undeveloped. Soil quality investigations have been performed to characterize Parcel H. According to the BEC (2008a) RAW, Phase 2 soil sampling performed in Parcel H indicated the presence of long amphibole fibers and/or long chrysotile fibers exceeding remediation goals at two locations (TSB-HJ-09 and TSB-HR-06).

BEC developed Thiessen/Voronoi polygons for Parcel H. These polygons were the basis for Northgate's remedial design for Parcel H (Figure 6). Northgate's remedial activities are described in Section 3.5.

3.0 PARCEL REMEDIATION AND CONFIRMATION SAMPLING

3.1 Scope of Work

Northgate conducted field work, under the oversight of NDEP, to remediate the Parcels during the months of March and April 2010. Work was performed in accordance with the RAW (BEC, 2008a). Remediation consisted of scraping the top 1 ft or less from each polygon shown on Figures 3 through 6. After each polygon was scraped to the target depth, confirmation soil samples were collected from each polygon. A total of 21 confirmation soil samples and 16 field quality control (QC) samples were collected from 18 polygons in the five Parcels. Field samples and the associated field QC samples were logged into the laboratories in Sample Delivery Groups (SDGs). The Parcel Soil Confirmation data are contained in nine SDGs.

The analytical data were validated by Laboratory Data Consultants, Inc. (LDC) in accordance with procedures described in the NDEP *Data Verification and Validation Requirements – Supplement, Henderson, Nevada, April 13, 2009,* established for the BMI Plant Sites and Common Areas Projects (NDEP, 2009a). A complete listing of the Parcel Soil Confirmation samples and SDGs is presented in Table 1-2 of the Northgate (2010a) Data Validation Summary Report for the Parcels, which is discussed later in this report.

A total of 11,262 tons, of soil were scraped during remediation of the Parcels, and transported in covered trucks to Apex Landfill, approximately 37 miles away from the Site. Figures prepared by Las Vegas Paving (LVP) are presented as Appendix A-1. Soil disposal manifests are presented in Appendix A-2. Descriptions of each scrape area are presented for each Parcel in the following sections (3.2 through 3.5). Parcels C and D are presented together because they share boundaries and have similar site-use history.

3.2 Parcels C and D Scrape Cleanup

Five scrape areas were located in Parcels C and D, as shown approximately on Figure 3. A total of 1,807 cy and 82 cy of soil were removed from Parcels C and D, respectively. More than 50% of the soil removed was in the vicinity of sample TSB-CJ-03 (680 cy). Total scrape depths in Parcel C and D ranged from 0.4 to 1.0 ft below original grade surface as shown in Table 1. Approximately 8,345 square feet (sf) south of the existing South Haul Road Fence line remains to be remediated by BMI when their haul road is removed (Parcel C and D Scrape Area Information, Appendix A-1). An Addendum to this report will be submitted to NDEP once BMI has removed the haul road.

3.3 Parcel F Scrape Cleanup

Eight scrape areas were located in Parcel F, as shown approximately on Figure 4 and in Appendix A-1 (Parcel F Scrape Area Information). A total of 3,928 cy of soil was removed from Parcel F. Total scrape depths in Parcel F ranged from 0.2 to 0.9 ft below original grade surface as shown in Table 1. Two small portions of proposed remediation areas in Parcel F were not scraped because of impediments: 1) approximately 1,000 sf section of the center portion of Fourth Street (along the western boundary of Parcel F) that was covered by asphalt, and 2) approximately 1,955 sf of railroad track along the southern boundary (Parcel F Scrape Area Information, Appendix A-1). However, excavation was conducted to the edge of the above-described inaccessible areas.

3.4 Parcel G Scrape Cleanup

Three scrape areas were located in Parcel G, as shown approximately on Figure 5 and in Appendix A-1 (Parcel G Scrape Area Information). A total of 1,094 cy of soil was removed from Parcel G. Total scrape depths in Parcel G ranged from 0.3 to 0.4 ft below original grade surface as shown in Table 1. Three small portions of the remediation areas in Parcel G were not scraped because of impediments: 1) approximately 1,880 sf of a section of the southern third of Fourth Street that was covered by asphalt; 2) approximately 1,955 sf of railroad track along the southern boundary; and 3) approximately 135 sf of asphalt located in the northeast corner (Parcel G Scrape Area Information, Appendix A-1). However, excavation was conducted to the edge of the above-described inaccessible areas.

3.5 Parcel H Scrape Cleanup

Two scrape areas were located in Parcel H, as shown approximately on Figure 6 and in Appendix A-1 (Parcel H Scrape Area Information). A total of 617 cy of soil was removed from Parcel H. More than 50% of the soil removed was in the vicinity of sample TSB-CJ-03 (680 cy). Total scrape depths in Parcel H ranged from 0.3 to 0.7 ft below original grade surface as shown in Table 1. Approximately 621 sf of soil in one remediation area in Parcel H was not scraped because of the presence of a landscaped, asphalt-covered public footpath (Parcel H Scrape Area Information, Appendix A-1). Soil was excavated to the edge of this inaccessible area.

3.6 Confirmation Sampling Rationale

Confirmation soil samples were collected in a manner consistent with the RAW (BEC, 2008a) at the same locations as original samples. The confirmation sampling locations were surveyed by LVP prior to sample collection. Table 1 presents a summary of information regarding the scrape

areas and confirmation sampling. Figures 3 through 6 show the Parcels, scrape areas, and confirmation sample locations and identifications.

3.7 Confirmation Sampling Methodology

Following remediation of soils, Northgate collected confirmation soil samples from each of the five Parcel remediation sites in April 2010. Field activities and sampling procedures were performed under the supervision of a Certified Environmental Manager and in accordance with the Basic Remediation Company (BRC) *Health and Safety Plan, BMI Common Areas, Clark County, Nevada*, dated October 2005 (BRC and MWH, 2005); the BRC *Field Sampling and Standard Operating Procedures (SOP), BMI Common Areas, Clark County, Nevada*, dated August 2007 (BRC, ERM and MWH, 2007); and the BRC SOP-12 Surface Soil Sampling for Asbestos, dated December 2008 (BRC, ERM, MWH, 2008).

As discussed previously, polygon size and shape were determined based on BEC's Phase 2 soil sampling results and locations where contaminants of concern were detected above remediation goals, triggering remediation (BEC, 2008a). At each remediation polygon, the trigger sample point was surveyed and marked by LVP before and after the parcel was scraped and graded. Samples to be analyzed for asbestos were collected using the methodology outlined in SOP-12 (BRC, ERM, MWH, 2008), all such samples are considered to be surface soil samples. The samples were collected from an area measuring 50 ft by 50 ft and subdivided into four quadrants as required by SOP-12. Once the confirmation sample point was marked and cleared, soil samples were collected for laboratory analysis.

The number and type of confirmation samples that were analyzed are summarized below.

Location	Asbestos	Dioxin	SVOC	PCB	Arsenic
Parcels C and D	4	1			
Parcel F	8		1	1	1
Parcel G	2		1		
Parcel H	2				

Confirmation sample results indicated that all analytes were detected below their respective NDEP BCLs and met the NDEP target goals of four or fewer long chrysotile fibers and less than one long amphibole fiber.

Use of the confirmation sampling results and the original 2007 and 2008 characterization data in the post-remediation risk assessment are discussed in the following sections.

4.0 DATA SUMMARY AND DATA USABILITY EVALUATION ASSESSMENT

This section summarizes the sources of analytical data and procedures used to evaluate the data, and presents data summaries used in the Parcels post-remediation HRA.

4.1 Investigation and Data Sources

As discussed in Section 2.1, analytical data obtained from BEC's 2007 and 2008 and Northgate's 2010 sampling events are used in the Parcels post-remediation HRA. The data set for the Parcels consists of 31 sample locations in Parcels C and D, 23 sample locations in Parcel F, 13 sample locations in Parcel G, and 24 sample locations in Parcel H.

4.2 Data Usability

The primary objective of the data usability evaluation is to identify appropriate data for use in the Parcels post-remediation HRA. Evaluation of the analytical data for the Parcels, in terms of usability for this assessment, was conducted in accordance with the criteria presented in the *Guidance for Data Usability in Risk Assessment (Parts A and B)* (U.S. EPA, 1992a,b) and the *NDEP Supplemental Guidance for Assessing Data Usability for Environmental Investigations at the BMI Facility in Henderson, NV* (NDEP, 2010a). These criteria include:

- Reports to risk assessors
- Documentation
- Data sources
- Analytical methods and detection limits
- Data review
- Data quality indicators (DQIs): precision, accuracy, representativeness, comparability, and completeness (PARCC).

Criterion I –Reports to Risk Assessors

The usability analysis of the site characterization data requires the availability of specific report components for review. The required information is available from the following documentation associated with the Site data and data collection efforts:

- The Site description is provided in Section 2 of this report. The *Sampling and Analysis Plan (SAP) to Conduct Supplemental Soil Characterization for Tronox Parcels C, D, F, G, and H, Henderson, Nevada* (BEC, 2008b), and the *Removal Action Work (RAW) Plan for Soil, Tronox Parcels C, D, F, G, and H Sites,*

Henderson Nevada, July 2008 (BEC, 2008a) identifies the sample locations and remediation areas. Figures 3 through 6 of this report also provide soil sample locations by parcels.

- Data are presented in Appendix B for the following DVSRs:
    - DVSR Tronox Parcels C, D, F, and G Investigation November 2007, dated February 2008 (ERM-West, 2008a)
    - DVSR Tronox Parcel H Investigation January 2008, dated April 2008 (ERM-West, 2008b)
    - DVSR Tronox Parcels C, D, F, G and H Supplemental Investigations June/July 2008, dated January 2009 (ERM-West, 2009)
    - DVSR Tronox Parcels C, D, F, G, and H Soil Confirmation April 2010, dated June 15, 2010 (Northgate, 2010a), with final response to comments, dated July 21, 2010 (Northgate, 2010c).
- The laboratory provided a quality assurance/quality control (QA/QC) narrative with each analytical data package, and the data review provides a narrative of qualified analytical results. A description of the analytical methods and detection limits is included. These narratives are included as part of each DVSR.
- Method-specific QC results are provided in each laboratory report, along with associated raw data. The laboratory reports and QC results are included as part of each DVSR.
- Data flags used by the laboratory were defined adequately and are discussed further below. The DVSRs and accompanying lab reports were considered complete for HRA purposes.
- Laboratory reports include the name and address of the laboratory, unique identification of the test report, client and project name, and dates of sample receipt and analysis. Each analytical report describes the analytical method used, and provides results on a sample-by-sample basis, along with sample-specific quantitation limits (SQLs), and provides results of appropriate QC samples, such as method blanks, laboratory control spike samples, surrogate recoveries, internal standard recoveries, matrix spike samples, second column confirmation, interference checks, and serial dilutions. All laboratory reports contained data equivalent to a Contract Laboratory Program (CLP) deliverable, inclusive of CLP QC summary forms where applicable, and the supporting raw data. Reported sample analysis results were imported into the project database.

Criterion II – Documentation Review

The objective of the documentation review is to ensure that each analytical result can be traced to a sample location, and that the procedures used to collect the environmental samples are appropriate. As discussed in the SAP and RAW, all sample collection and handling procedures were consistent

with NDEP-approved *BRC Field Sampling and Standard Operating Procedures* (BRC 2007) and the *Tronox Quality Assurance Project Plan* (QAPP; AECOM/Northgate 2009). Chain-of-custody (COC) forms prepared in the field were reviewed and compared to the analytical data results provided by the laboratory to ensure completeness of the data set. Based on the documentation review, all samples analyzed by the laboratory were correlated to the correct geographic locations and are shown in Figures 3 through 6 of this report. Summary data tables are provided in Appendix C of this report. All reviewed reports provide adequate information regarding sample results related to location and sampling procedures.

Criterion III – Data Sources

The review of data sources is performed to ensure that the analytical techniques are appropriate to identify the COPCs, appropriate analytical methods have been used, and adequate sample coverage of source areas has been obtained. All analytical sample data results for soil were provided. The data collection activities were developed to characterize a broad spectrum of chemicals potentially present on the parcels, including asbestos, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, radionuclides, dioxin/furans, polychlorinated biphenyls (PCBs), PAHs, organochlorine pesticides (OCPs), and petroleum hydrocarbons. Based on the sample locations (taken at both random and judgmental locations), the conceptual site model for each parcel, and the sample results, the data for the analytical suites were deemed representative to evaluate site conditions.

Criterion IV – Analytical Methods and Detection Limits

In addition to the appropriateness of the analytical techniques evaluated as part of Criterion III, it is necessary to evaluate whether the detection limits are low enough to allow adequate characterization of risks. At a minimum, this data usability criterion can be met through the determination that routine U.S. EPA reference analytical methods were used in analyzing samples collected from the property. Each of the identified U.S. EPA methods was approved by NDEP as part of the SAP (BEC 2007; BEC, 2008b) and the QAPP (BRC 2008b). The range of detection limits achieved in the field samples was compared to NDEP BCLs. With the exceptions of benzo(a)pyrene and dibenz(a,h)anthracene, which are PAHs, all had non-detectable results, with method detection limits below NDEP BCLs.

With regard to the PAH analysis, it appears that the NDEP-approved DVSRs associated with the initial sampling events in 2007 and 2008 were all reported to the practical quantitation limit (PQL) rather than the SQL. This resulted in reported detection limits that were greater than the BCLs for benzo(a)pyrene and dibenz(a,h)anthracene. However, based on review of the

laboratory data packages, and as discussed with the laboratory, the procedure for evaluating PAH results consisted of the following steps. First, the laboratory reviewed the chromatograms. If a PAH was detected above the PQL, then the value was reported. If the PAH was detected above the SQL, but below the PQL, then the value was reported and flagged as a J value. If there was no indication that the PAH was detected, it was reported as a non-detect value at the PQL. These procedures are consistent with the approved DVSR for the 2007 and 2008 sampling program. As discussed further in Section 5.2, this has little impact on the overall evaluation, because very few soil borings had detections of PAHs.

Criterion V – Data Review

The data review portion of the data usability process involves review of the quality of the analytical data received from the laboratory by a professional knowledgeable in HRA data application. The data set reviewed by Renee Kalmes, MSPH, CIH, and Greg Brorby, DABT. All soil data were subject to data validation using EPA guidelines (U.S. EPA, 1999; 2001; 2004a; 2005a, b; 2008; 2009a), the BMI Plant Site Specific Supplemental Guidance on Data Validation from NDEP (NDEP, 2009a), and BRC SOP 40 and Data Review/Validation (BRC, 2009). These federal EPA guidelines, which were prepared for CLP data, were adapted to reflect the analytical methods and measurement quality objectives established for the individual sampling events and the guidance provided by NDEP.

Four separate DVSRs were prepared for the Parcel data (ERM-West, 2008a,b; ERM-West, 2009; Northgate, 2010a). Any analytical errors and/or limitations in the data have been addressed, and explanations for data qualification are provided in the respective data tables. The results of LDC's data review of these issues are presented in the DVSRs and are summarized below.

Although certain laboratory limits, such as percent recovery and relative percent difference (RPD) between sample and duplicate, were exceeded for certain compounds or analyses, as identified by the laboratory (and confirmed during LDC's review of the data), there does not appear to be a widespread effect on the quality of the analytical results. Furthermore, based on a review of the laboratory narratives (provided in the laboratory reports in each DVSR), the laboratory does not believe that the observed exceedances of laboratory criteria are cause for concern. As discussed below, when quality criteria were not met for some analytical results, various data qualifiers were added to indicate limitations and/or bias in the data. The definitions for the data qualifiers, or data validation flags, used during validation are those defined in the DVSRs. Sample results were rejected based on findings of serious deficiencies in the ability to properly collect or analyze the sample and meet QC criteria. Depending on the specific DVSR,

91% to 99.8% of the data obtained during the field investigations were found to be valid and were not rejected.

It was noted during the review of the 2010 soil confirmation results that some of the reported values for PAHs at sample location TSB-FR-02 in Parcel F were rejected due to exceedances of internal calibration limits. For purposes of the HRA, we have excluded the original PAH data for this location, because this area has been remediated. However, because insufficient post-remediation data were available, another confirmation sample (and field duplicate) was collected on November 30, 2010 to ensure that the cleanup goals for PAHs were met for the remediation polygon associated with this sample location. The results for these additional samples are provided in Appendix G; however, they are not included in any of the tabular summaries or in the risk assessment calculations. As shown in the appendix, PAHs were not detected in either of these samples at detection limits below the BCLs. These results confirm that this area of Parcel F has been remediated and inclusion of these samples would not affect the conclusions of the post-remediation HRA presented herein.

Analytical results for other qualifiers, and their potential usability in the HRA, were also reviewed. Specifically, all *J*-qualified data were identified (See Appendix B, Table B-1) and evaluated. Data were qualified as *J* for one the following reasons:

- Calibration violations, indicating a low bias (4 instances)
- MS/MSD recovery outside of control limits (140 instances), almost exclusively metals
- Surrogate recovery outside of control limits (4 samples)
- Holding-time exceedance (77 samples), primarily OCPs
- Laboratory control sample (LCS) recovery outside of control limits (14 samples), all calcium.

Table B-1 provides the reported soil concentration for each of the *J*-qualified samples. In all instances, the reported soil concentration is significantly below its respective BCL or the chemicals were not health-based, site-related chemicals of interest (i.e., zirconium, chlorite, sodium). Therefore, use of the *J*-qualified data in the HRA is not expected to have a substantial impact on the overall conclusions of the report, and all *J*-qualified data were retained for purposes of the post-remediation HRA.

Criterion VI – Data Quality Indicators

Data quality indicators (DQIs) are used to verify that sampling and analytical systems used in support of project activities are in control and that the quality of the data generated for this project is appropriate for making decisions affecting future activities. The DQIs address the field and analytical data quality aspects, as they affect uncertainties in the data collected for site characterization and risk assessment. The DQIs include completeness, comparability, representativeness, precision, and accuracy. The project QAPP provides the definitions and specific criteria for assessing DQIs using field and laboratory QC samples and is the basis for determining the overall quality of the data set. Data validation activities included the evaluation of these parameters, and all data not meeting the established criteria were qualified during the validation process.

"Completeness" is measured by the total number of acceptable data points and total number of samples collected by source area and exposure area. Field completeness is defined as the percentage of samples actually collected versus those intended to be collected. This field completeness calculation is based on the total sample locations scheduled compared to the COC requests sent to the laboratories. The field completeness goals stated in the QAPPs are 90%. A comparison of samples reported in the database indicates actual field completeness of 100% for all sampling events. All COC requests were faithfully executed by the laboratories, with minor exceptions detailed in the data validation memoranda. Laboratory completeness is defined as the percentage of valid data points versus the total expected from the laboratory analyses. Actual laboratory completeness was 100% on the basis of sample analysis (i.e., all requested analyses were performed and reported by the laboratories), and depending on the specific DVSR, 91.41% to 99.8% completeness based on valid data, with 0.2% to 8.59%of the data qualified as rejected (*R*).

"Comparability" is a qualitative characteristic expressing the confidence with which one data set can be combined with another for purposes of estimating exposure. Comparability is a qualitative expression of the measure of confidence that two or more data sets may contribute to a common analysis. In general, comparability of data was maximized by using standard methods for sampling and analysis, reporting data, and data validation over the 2007/2008 and 2010 sampling programs. With the exception of the reporting issue for PAHs (PQL rather than the SQL), the reporting requirements were the same for all the investigations. Similar sampling methods and testing methods were used throughout the program.

"Representativeness" is the degree to which data accurately and precisely represent a characteristic of the population at a sampling point or an environmental condition. There is no standard method or formula for evaluating representativeness, which is a qualitative term. "Representativeness" is achieved through selection of sampling locations that are appropriate relative to the objective of the specific sampling task, and by collection of an adequate number of samples from relevant types of locations. As noted, the initial sampling was conducted in accordance with the NDEP-approved *Phase 2 Sampling and Analysis Plan to Conduct Soil Characterization* (BEC, 2007). The investigation involved collection of random soil matrix samples placed within a grid across the Parcels. The random sample locations were supplemented with judgment-based sampling locations targeting specific site features and LOUs. The placement of the sample locations was deemed representative to evaluate the soil conditions in the context of the CSM.

"Precision" is a measure of the degree of agreement between replicate measurements of the same source or sample. Precision is expressed by RPD between replicate measurements. Replicate measurements can be made on the same sample or on two samples from the same source. Field precision for the parcel samples was assessed by evaluating the field duplicate results. As discussed under *Criterion V – Data Review*, matrix spike versus matrix spike duplicates (MS/MSD) were evaluated focusing on the samples that were *J*-qualified. In all instances, the reported soil concentration is significantly below its respective BCL. Therefore, use of the *J*-qualified data in the post-remediation HRA is not expected to have a substantial impact on the overall conclusions of the report, and all *J*-qualified data were retained for purposes of the HRA.

"Accuracy" measures the level of bias that an analytical method or measurement exhibits. Several QC parameters are used to evaluate the accuracy of reported analytical results:

- Holding times;
- Method blanks;
- Surrogate spike recovery; and
- LCS percent recovery.

As discussed under *Criterion V – Data Review*, holding-time exceedances and calibration exceedances were evaluated focusing on the samples that were *J*-qualified. In all instances, the reported soil concentration is significantly below its respective BCL, or the chemicals are not site-related chemicals of interest. Therefore, use of the *J*-qualified data in the post-remediation HRA is not expected to have a substantial impact on the overall conclusions of the report, and all *J*-qualified data were retained for purposes of the HRA.

Data Usability Conclusions

Evaluation of the analytical data for the Parcels, in terms of usability for the risk assessment, was conducted in accordance with U.S. EPA and NDEP guidance. Some data points were found to be qualified, and all *J*-qualified data were evaluated individually. Based on the evaluation, all data usability requirements were met, and with the exception of the rejected data discussed above, all Parcel data were deemed to be usable for risk assessment purposes.

4.3 Data Used in Post-Remediation Health Risk Assessment

A complete set of validated data for the Parcels is provided in Tables C-1 through C-10 of Appendix C. Data not considered in the post-remediation HRA due to soil removal and soil scraping activities are highlighted in each table. All confirmation data obtained in 2010 following the soil removal activities are included in these tables, with the exception of the recently collected confirmation data for PAHs described above that is provided in Appendix G.

Based on the post-remediation data, summaries for the Parcels are provided in Table 2 for organics and general chemistry, and in Table 3 for inorganics and radionuclides. The data summaries present the number of samples, frequency of detection, minimum concentration detected, maximum concentration detected, location of maximum detect, minimum non-detect limit, maximum non-detect limit, determined counts of detections above NDEP worker BCLs, and determined counts of non-detects above NDEP worker BCLs (NDEP, 2010b). The NDEP worker BCLs shown in the table are the lower of the indoor and outdoor worker values.[1] As discussed further in Section 5.2, NDEP BCLs are used as part of the toxicity screen for determining COPCs.

Table 4 presents the soil data summary results for asbestos. There are a total of 72 post-remediation surface soil (0- to 0.5-ft bgs) samples. Results are reported in terms of the number of long fibers (i.e., >10 µm long and <0.4 µm wide) observed in the sample. As shown in the table, no long amphibole fibers were observed in any of the samples. A total of 34 long chrysotile fibers were observed in 20 locations; a maximum of four long chrysotile fibers were observed in any one sample.

[1] Worker BCLs are based on combining human health toxicity values with a standard exposure factor to estimate contaminate concentrations in environmental media that are considered by NDEP to be protective of human exposure (including sensitive sub-groups) over a lifetime. Worker BCLs do not address intrusion of VOCs into indoor air, particulate emission during construction/excavation activities, and groundwater contact from soil-leached chemicals.

5.0 POST-REMEDIATION HEALTH RISK ASSESSMENT

This section presents the post-remediation HRA and includes the following items:

- Exposure Scenarios and Conceptual Site Model
- Selection of Chemicals of Potential Concern
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization.

The post-remediation HRA follows the basic procedures outlined in the U.S. Environmental Protection Agency's (U.S. EPA's) *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual* (U.S. EPA, 1989). Other guidance documents consulted in formulating the risk assessment include:

- Guidelines for Exposure Assessment (U.S. EPA 1992a)
- Exposure Factors Handbook (U.S. EPA 1997)
- Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) (U.S. EPA 2004a)
- Soil Screening Guidance: Technical Background Document (U.S. EPA 1996)
- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (U.S. EPA 2002a)
- Soil Screening Guidance for Radionuclides (U.S. EPA 2000)
- Technical Support Document for a Protocol to Assess Asbestos-Related Risk, Final Draft (U.S. EPA 2003a)
- Nevada Administrative Code Chapter NAC 445A. Adopted Permanent Regulation of the Nevada State Environmental Commission. LCB File No. R119-96 (NDEP 1996)
- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) (U.S. EPA 2009b).

5.1 Exposure Scenarios and Conceptual Site Model

The exposure scenarios considered in the post-remediation HRA depend on the relevant exposure pathways and receptor populations for the Parcels. The CSM is a tool used in risk assessment to describe relationships between chemicals and potentially exposed human receptor populations, thereby delineating the relationships between the suspected sources of chemicals identified at the Site, the mechanisms by which the chemicals might be released and transported in the environment, and the means by which receptors could come in contact with the chemicals. The CSM provides a basis for defining data quality objectives (DQOs), guiding site characterization, and developing exposure scenarios.

5.1.1 Sources and Release Mechanisms

A list of potential site-related chemicals (SRCs) was agreed upon with NDEP, based on review of historical Site operations and practices, as well as those at the neighboring facilities. Not all the SRCs are related to Parcel operations, but were included because they may be related to neighboring facilities. The Parcel SRCs include:

- Volatile organic chemicals (VOCs)
- Semivolatile organic chemicals (SVOCs)
- Organochlorine pesticides (OCPs)
- Polychlorinated biphenyls (PCBs)
- Dioxins/furans
- Asbestos
- Metals
- Perchlorate
- Cyanide
- Radionuclides.

As discussed in the relevant Parcel SAPs (BEC 2007; BEC 2008b), the distribution of sampling locations involved collecting random soil matrix samples that were supplemented with judgment-based sampling locations targeting specific site features within the Parcels.

Potential release mechanisms from above-ground source areas, such as spills, leaks, or accidents, could have released SRCs to surface soils. These SRCs may have then leached into subsurface soils and eventually migrated to groundwater.

In addition to the potential primary release mechanisms, secondary release mechanisms may include resuspension of SRCs in surface soils into ambient air. Volatile organics detected in the subsurface also have the ability to migrate upward to ambient air or into buildings.

Although all of these pathways are considered in the CSM, the scope of the Parcel HRA is limited to evaluating direct contact with affected soil. Additionally, findings from the Site-wide soil gas HRA (Northgate, 2010b) are included in this assessment.

5.1.2 Potential Receptors and Exposure Pathways

The identification of potentially exposed populations and exposure pathways is supported by the CSM. For a complete exposure pathway to exist, all of the following elements must be present (U.S. EPA, 1989):

- A source and mechanism for chemical release
- An environmental transport medium (i.e., air, water, soil)
- A point of potential human contact with the medium
- A route of exposure (e.g., inhalation, ingestion, dermal contact).

As discussed previously, the Parcels are composed of vacant land. In the future, the Parcels are likely to be used for industrial and/or commercial purposes. Accordingly, current and future "onsite receptors" include long-term indoor workers, long-term outdoor workers, and short-term construction workers (U.S. EPA, 2002a). Other potential onsite receptors, such as visitors or trespassers, do not warrant assessment. As discussed by U.S. EPA (2002a), evaluation of exposures to members of the public under a non-residential land-use scenario is not warranted, for two reasons:

1. Public access is generally restricted at industrial sites
2. While the public may have access to commercial sites, onsite workers have a much higher exposure potential, because they spend substantially more time at a site.

Current and future "offsite receptors" are residential and worker receptors located outside the Parcel boundaries who could be exposed to airborne chemicals emitted from the Site during short-term construction projects (U.S. EPA, 2002a). Considering the distance from the Parcels to the nearest offsite residents, and based on the relative difference in the onsite construction particulate emission factor (which is on the order of 10^{+6} m^3/kg) and the offsite receptor particulate emission factor during construction (which is on the order of 10^{+8} m^3/kg), versus other exposure factors that may be higher for the offsite receptors, the onsite construction worker exposure will be greater

than that of the offsite receptor. Accordingly, offsite receptors are not evaluated quantitatively in the HRA. This issue is discussed further in the uncertainty assessment.

5.1.3 Conceptual Site Model

Based on the source and release mechanisms identified in the Parcels, Figure 7 presents the following exposure pathway and receptor populations that are considered in the HRA:

- Indoor commercial workers[2]
  - Incidental soil ingestion[3]
  - External exposure from soil[4]
  - Indoor inhalation of VOCs from soil and groundwater[5, 6]
- Outdoor commercial/industrial workers
  - Incidental soil ingestion[2]
  - External exposure from soil[3]
  - Dermal contact with soil
  - Outdoor inhalation of dust[2, 7]
  - Outdoor inhalation of VOCs from soil and groundwater[8, 9]
- Construction workers
  - Incidental soil ingestion[2]
  - External exposure from soil[3]
  - Dermal contact with soil

[2] In accordance with U.S. EPA, 2002a, dermal absorption is not considered to be a complete exposure pathway for the indoor worker. Soil ingestion is identified by U.S. EPA (2002a) as a potentially complete exposure pathway for an indoor worker, due to potential for contact through ingestion of soil tracked indoors from outside. Inhalation of indoor dust (particulates) is accommodated via the soil ingestion pathway (U.S. EPA, 2002a, Exhibit 4-1).
[3] Includes radionuclide exposures; however, as noted in Section 5.2, radionuclides are not selected as COPCs for the Parcels.
[4] Only radionuclide exposures; however, as noted in Section 5.2, radionuclides are not selected as COPCs for the Parcels.
[5] Indoor inhalation of VOCs from soil and groundwater was evaluated as part of a site-wide assessment based on collected soil-vapor measurements, and the results are summarized in this report.
[6] Radon is not expected to be an issue for the Site, because future use will remain commercial/industrial. In the event it is concluded that Site radionuclide concentrations are greater than background, the need for an evaluation of potential radon exposure will be discussed with NDEP.
[7] Includes asbestos exposures.
[8] Pathway was evaluated quantitatively only if estimated indoor air concentrations indicated the need as part of the site-wide soil gas assessment.
[9] Quantitatively evaluated only if warranted based on indoor exposures.

- Outdoor inhalation of dust[2, 5]
- Outdoor inhalation of VOCs from soil and groundwater.

With regard to the pathways that involve direct contact with soil, commercial workers are assumed to come into direct contact with shallow soil, 0–2 ft bgs, and construction workers are assumed to come into direct contact with soil at 0–10 ft bgs, as specified in the approved HRA Work Plan (Northgate, 2010d). It should be noted that incidental ingestion of groundwater or dermal contact with groundwater during short-term construction activities are not considered complete pathways due to groundwater depth being greater than 20 ft bgs.

5.2 Selection of Chemicals of Potential Concern Based on Direct Contact with Soil

All chemicals detected in validated soil samples collected from 0–10 ft bgs were used as the initial list of COPCs[10]. However, to ensure that the risk assessment focuses on those chemicals that contribute the most to the overall risk (U.S. EPA, 1989), the following procedures were used to eliminate chemicals for quantitative evaluation in the risk assessment:

- Identification of metals and radionuclides for which Site concentrations are at or less than background concentrations
- Identification of chemicals that will not contribute significantly to risk and hazard estimates based on a toxicity screen.

Each of these procedures is discussed in the following sections.

5.2. 1 Evaluation of Site Concentrations Relative to Background

Consistent with U.S. EPA guidance (1989, 1992b,c), site data for metals and radionuclides were evaluated relative to background concentrations, to identify those that are not elevated above naturally occurring levels and can, therefore, be eliminated from further quantitative evaluation in the health risk assessment. This evaluation was based on a combination of exploratory data analysis (EDA) and appropriate statistical methods (U.S. EPA, 2002b). When the weight of evidence of the EDA and results of the statistical analyses indicated that a particular chemical is within background levels, then the chemical was not identified as a COPC. For radionuclides, NDEP's *Guidance for Evaluating Radionuclide Data for the BMI Plant Sites and Common Area Projects* (NDEP, 2009b) and *Guidance for Evaluating Secular Equilibrium at the BMI Complex*

[10] Although the direct contact exposure pathway focuses on the upper 10 feet, it should be noted that no chemicals above BCLs or above the deep background data set range were detected in soils analyzed to depths of 30 feet below ground surface in the Parcels..

and Common Areas (NDEP, 2009c) were followed to assess secular equilibrium when performing background comparisons.

For the evaluation of metals, NDEP has requested that Tronox use the Site soil concentrations from Remediation Zone A (RZ-A) as the background data set for comparisons to Site concentrations (NDEP, 2010c). The RZ-A soil samples were collected as part of the Area IV investigation (i.e., a subset of the Phase B Area IV samples) and were analyzed in accordance with the *Revised Phase B Investigation Work Plan, Tronox LLC Facility, Henderson, Nevada, December 2008* (AECOM, 2008) and the *Revised Phase B Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada, July 2009* (AECOM and Northgate 2009). A detailed discussion of the RZ-A background data set is contained in the *Revised Technical Leaching Memorandum*, dated November 18, 2010 (Northgate 2010e). Specifically, the RZ-A background dataset consists of total of 31 samples collected from 14 borings. Sixteen samples were collected between 0.5 and 2 ft bgs and 15 samples were collected between 10 and 11.5 ft bgs. Primary samples and field duplicates were treated as independent samples, on the basis of preliminary evaluation indicating that the variance of the duplicates was similar to the variance of the primary samples, in consultation with NDEP guidance (NDEP, 2009a; Paul Black, pers. comm., November 11, 2009).

Site data collected from locations within the Parcels at starting depths between 0 and 10 ft bgs were included in this evaluation. Samples were generally collected at starting depths of 0 ft bgs (87 samples) or 10 ft bgs (63 samples), although a few samples were collected at 5 ft bgs (9 samples). Field duplicates were again treated as independent samples.

For radionuclides, Parcels soil concentrations were compared to background levels using the existing soils background data presented in the *Background Shallow Soil Summary Report, BMI Complex and Common Area Vicinity* (BRC and TIMET, 2007), which includes both the Environ (2003) data set and the BRC/TIMET data set collected in 2005. Specifically, only the subset of shallow background data identified as being from sediments derived from the McCullough Range were used, based on the recommendation of NDEP (NDEP, 2009d) These samples were collected at 0, 5, and 10 ft bgs. The total number of samples in this data set ranged from 81 to 101, depending on analyte, with approximately 30 to 40 samples for each depth interval (see Table 7).

EDA was performed using summary statistics (*Guidance on the Development of Summary Statistics Tables for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada*; NDEP, 2008e) and normal quantile-quantile (Q-Q) plots and side-by-side box-and-whisker plots

to qualitatively evaluate whether the Parcel and background data are representative of a single population. These plots are included in Appendix D (metals) and E (radionuclides). Normal Q-Q plots provide a visual assessment of how closely a data set follows a normal distribution. Data points that fall on roughly a straight line may be considered to follow a normal distribution. When the highest concentrations fall above the straight line, the data set may follow a lognormal distribution. When both the background and site data are included, the Q-Q plots provide a direct visual comparison of the two distributions. A curve that is higher in the vertical direction indicates a higher distribution of values (U.S. EPA 2002b). No further statistical analysis (normality, outliers) was conducted on the data in the Q-Q plots. Side-by-side box-and-whisker plots provide a visual comparison between the site and background data sets and an easy assessment of whether the bulk of samples from the site are above background. For each data set, the box in the box-and-whisker plot encompasses the central 50% of the results from the 25th to 75th percentiles. Substantial overlap between the boxes for background and site data indicates that the site data may not be significantly different from background. The whiskers demarcate one "step" above the 75th percentile and below the 25th percentile. One "step" is defined as 1.5 times the interquartile range (the difference between the 75th and 25th percentiles). Data points above and below the whiskers are considered potential outliers and are shown on the plots as open circles; an "x" on the plot represents non-detect values.

The computer statistical software program Guided Interactive Statistical Decision Tools (GiSdT®; Neptune and Company, 2007) was used to perform all statistical comparisons. Specifically, statistical background comparisons were performed using the Quantile test, Slippage test, *t*-test, and Wilcoxon Rank Sum test with Gehan modification (this suite of tests is sometimes referred to as Gilbert's Toolbox). The *t*-test is parametric, which assumes that the data are normally distributed. In contrast, the Wilcoxon Rank Sum test, Quantile test, and Slippage test are non-parametric, and thus do not require an assumption of whether the data are normally or lognormally distributed (U.S. EPA, 2002b; NDEP, 2009e). These non-parametric tests are described further below.

- The Wilcoxon Rank Sum test performs a test for a difference between the sums of the ranks for two populations. This is a non-parametric method for assessing differences in the centers of the distributions that relies on the relative rankings of data values. Knowledge of the precise form of the population distributions is not necessary. The Wilcoxon Rank Sum test has less power than the two-sample *t*-test wherein the data are normally distributed, but the assumptions are not as restrictive. The GiSdT® version of the Wilcoxon Rank Sum test uses the Mantel approach for ranking the data, which is equivalent to using the Gehan ranking

system. The Gehan ranking system is used to rank non-detects with the rest of the data (NDEP, 2009e).

- The Quantile test addresses tail effects that are not addressed in the Wilcoxon Rank Sum test. The Quantile test looks for differences in the right tails (upper end of the data set), rather than the central tendency like the Wilcoxon Rank Sum test. The Quantile test was performed using a defined quantile = 0.80 (Paul Black, pers. comm., Oct. 7, 2009).
- The Slippage test looks for a shift to the right in the extreme right tail of the background data set versus the extreme right tail of the site data set. This test determines, for each metal and radionuclide, whether the number of site concentrations that are greater than the maximum background concentration is greater than would be expected statistically if the site and background distributions are the same.

Non-detect results were set equal to one-half of the limit of detection for purposes of the parametric test and set equal to the detection limit for purposes of the non-parametric tests. The sample quantitation limit (SQL) was used as the detection limit for both the Site and background data sets, per NDEP guidance (NDEP 2008d). An alpha = 0.05 is typically used to evaluate a statistically significant result (U.S. EPA, 2002b). However, as more tests are performed, it is more likely that a statistically significant result will be obtained purely by chance. Given the use of multiple statistical tests, an alpha = 0.025 was selected as a reasonable significance level for determining whether Site data are different from background (NDEP, 2009e). Generally, any chemical that resulted in a *p*-value less than 0.025 in one of four tests was retained for further consideration in the COPC selection process. Additionally, because these tests are set up with one-sided hypotheses, not can the differences between the two samples be detected, but also, a directional determination can be made as well (e.g., site is greater than background).

For radionuclides, if approximate secular equilibrium (discussed further below) is exhibited in an isotope decay chain, then background comparisons were performed to confirm whether all the radionuclides in that decay chain are similar to background. If any radionuclide is greater than background, then all the radionuclides in that decay chain generally would be carried forward in the risk assessment. If they are not greater than background, then they would not be identified as COPCs and would not be evaluated quantitatively in the risk assessment. If secular equilibrium is not exhibited, then background comparisons are performed for each radionuclide separately, and individual radionuclides would be selected as COPCs, depending on the outcome of the background comparisons.

Metals

The summary statistics for the background (RZ-A) and Parcel data are summarized in Table 5, including number of detections, total number of samples, percent detections, minimum detected value, maximum detected value, median, mean, and standard deviation (NDEP, 2008e); Q-Q and box-and-whisker plots are included in Appendix D. Consistent with NDEP guidance, the median, mean, and standard deviation are based on detected values (NDEP, 2008e).

The results for the four statistical tests (p-values) are also included in Table 5, as well as a determination as to whether the site data are greater than background. It is important to note that many of the p-values for multiple tests are close to or equal to one, suggesting that the site data are lower than background. This issue is discussed further below. In addition, there are several chemicals for which there is low frequency of detection (less than 25%) in the site or background data set. Finally, chemicals for which only one p-value was less than 0.025 are noted on Table 5. Based on these results, the chemicals identified as being greater than background in the Parcels include arsenic, beryllium, total chromium, mercury, molybdenum, sodium, and uranium.

All of these chemicals were evaluated further in the COPC selection process (Section 5.2), regardless of whether the elevated concentrations could be related to the CSM for the Parcels. In addition, as also noted in Table 5, there was an insufficient number of detected values in either the background or site data sets, or both, for several metals to reliably determine whether the site data were greater than background. Therefore, these metals (antimony, boron, chromium VI, platinum, selenium, silver, thallium, tin, and tungsten) were also evaluated further in the COPC selection process (Section 5.2).

Radionuclides

Secular equilibrium is defined by the International Union of Pure and Applied Chemicals (IUPAC) as "Radioactive equilibrium where the half-life of the precursor isotope is so long that the change of its activity can be ignored during the period of interest and all activities remain constant" (IUPAC, 1997). In other words, the activity of each radionuclide within an isotope decay chain is essentially the same. The analysis of secular equilibrium was performed according to NDEP's *Guidance for Evaluating Radionuclide Data for the BMI Plant Sites and Common Areas Projects* (NDEP, 2009b) and *Guidance for Evaluating Secular Equilibrium at the BMI Complex and Common* Areas (NDEP, 2009c). The uranium decay series and thorium decay series were broken down by different depth intervals, per the recommendations from NDEP to use the same chemical-specific depth intervals used for the background comparison (BRC/TIMET, 2007). The uranium decay series includes, in order, U-238, U-234, Th-230, and Ra-226. The thorium decay series includes Th-232, Th-228, and Ra-228. The depth intervals used for the

uranium decay series were for data collected between 0 and 6 ft bgs, and between 6 and 10 ft bgs. The Th-232 chain was analyzed for the single depth interval of 0 to 10 ft bgs.

The results of the equivalence test for secular equilibrium of radionuclides in the Parcels are presented in Table 6a. The table includes the *p*-value, a conclusion about secular equilibrium, the delta used, the sample size, the number of missing data pairs (if any), the mean proportions of radioactivity, lower and upper 95% confidence intervals, and data shifts (the value by which all negative activities are shifted upward toward zero, if this setting was used). The equivalence test analysis was performed using Neptune's EnviroGiSDT statistical analysis tool. The null hypothesis of the test is that the radionuclides within a decay series are not in secular equilibrium. Per NDEP guidance (NDEP, 2009c), the delta value (maximum deviation from equal proportions) was set to 0.10 (based on NDEP evaluations of background data sets), and a decay series was considered to be in secular equilibrium if the p-value was less than the standard significance level of 0.05. As noted in the documentation for the GiSDT software, the upper and lower confidence intervals are included primarily to show which radioisotopes are producing more/less radioactivity than the others, in case secular equilibrium is not shown. As shown in Table 6a, the equivalence test indicates that the thorium decay series is in approximate secular equilibrium in shallow soils between 0 and 10 ft bgs. The uranium decay series also is in approximate secular equilibrium in shallow soils between 0 and 6 ft bgs, but not between 6 and 10 ft bgs, with a delta value of 0.10. This result may be an artifact of the number of samples collected from this depth interval (n=61) vs. the number of samples collected between 0 and 6 ft bgs (n=90) or for the thorium decay series (n=156). As also shown in Table 6a, the confidence limits on the mean proportions of radioactivity for the uranium series for shallow soil between 0 and 6 ft bgs are wider than for shallow soil between 6 and 10 ft bgs, and much wider than for the thorium decay series for shallow soil between 0 and 10 ft bgs. The wider the confidence limits on the mean proportions of radioactivity, the more likely that the null hypothesis will not be rejected, given a fixed value for delta, as illustrated in the example provided in NDEP's (2009c) guidance. Further, NDEP's equivalence testing of the Parcel C/D/F/G data, which appears to have been done for a single depth interval, indicates that the uranium decay series is in approximate secular equilibrium (NDEP, 2009c).

Secular equilibrium was further evaluated using exploratory data analysis. Box-and-whisker plots (box-plots) of the Parcels radionuclide results for the isotopes in the uranium decay series and the thorium decay series are presented in Figure 8. Correlation matrices for these same two decay chains are shown in Table 6b-i. In conjunction with the equivalence testing described above, these exploratory data analysis methods serve as additional lines of evidence for establishing whether the decay chains are in secular equilibrium (NDEP, 2009c).

The box-plots in Figure 8 show that, in general, the activities of the isotopes in the uranium decay series (Figure 8a) and thorium decay series (Figure 8b) have comparable mean activities, although for both series, the radium isotopes appear to be slightly lower than the uranium and thorium isotopes. In general, the box plots suggest that the two decays series are in approximate secular equilibrium.

As shown in Table 6b-i, the correlation matrices show a positive correlation between the isotopes within each chain, which would be consistent with decay chains in secular equilibrium. The correlations are strongest for the uranium decay chain, where the strongest correlation occurs between U-238 and U-234, and the weakest correlations occur between Ra-226 and the uranium isotopes. For the thorium decay chain, the strongest correlation is between the Th-232 and Th-228, while a weaker correlation is exhibited between Ra-228 and the thorium isotopes. The correlation between Ra-228 and Th-232 is very weak, reflective of the larger scatter in the Ra-228 activities. A similar picture was seen for the decay-chain correlations for the 2005 BRC/TIMET Background data set, which are presented in Table 6b-ii.

Background Comparison

Comparisons between site data and the background data set for the Th-232 decay series were based on combined data between 0 and 10 ft bgs in each data set, as recommended in BRC's Background Soil Summary Report (BRC/TIMET, 2007). For the U-235 and U-238 decay series, the site and background data were subdivided into two depth intervals, as also recommended in the Background Soil Summary Report (BRC/TIMET, 2007). For these radionuclides, site data collected between 0 and 6 ft bgs were compared to background data collected at 0 and 5 ft bgs, and site data collected between 6 and 10 ft bgs were compared to background data collected at 10 ft bgs. The background comparison tests were carried out using Neptune's EnviroGiSDT statistical analysis tool.

The summary statistics for the background and site radionuclide data for the Parcels are summarized in Table 7, including the number of detections, total number of samples, percent detections, minimum detected value, maximum detected value, median, mean, and standard deviation (NDEP, 2008e); Q-Q and box-and-whisker plots are included in Appendix E.

Consistent with NDEP guidance, the median, mean, and standard deviation are based on detected values (NDEP, 2008e). The results for the four statistical tests (*p*-values) are also included in the table, as well as a determination as to whether the site data are greater than background. Based on these results, Th-228, U-234, and U-235 are identified as being above background, although this is based only on the results of a single test for Th-228. Given that the radionuclide chains are

generally within secular equilibrium and there is no reason to believe that the Parcels have been affected by thorium or uranium isotopes, radionuclides were not evaluated further in the COPC selection process.

5.2.2 Evaluation of Site Concentrations Relative to Toxicity Screen

Table 8 contains a list of all chemicals (64 potential COPCs) that were either positively identified in at least one soil sample as presented in Tables 1 through 3 or, for metals, were determined to be above background (or for which a background determination could not be made) based on evaluation presented in Table 5. Based on the methods in the approved HRA Work Plan (Northgate, 2010d), a combination of frequency of detection (chemical is detected in less than 5% of the samples) and a toxicity screen were used to further reduce the initial list of potential COPCs. No chemical was eliminated based solely on frequency of detection.

The chemical toxicity screen used was based on comparison of the maximum detected concentration to a percentage of the BCL. To illustrate this BCL comparison, Table 8 presents the ratio of the BCL divided by the maximum detected soil concentration. A ratio >10 indicates that the maximum detected concentration is less than 10% of the BCL. A ratio of >100 indicates that the maximum detected concentration is less than 1% of the BCL. The results of the chemical toxicity screen can be summarized as follows:

- With the exception of 4,4'-DDE, alpha-BHC, beta-BHC, benzo(a)pyrene, hexachlorobenzene, Aroclor 1254, perchlorate, arsenic, and dioxin, the detected chemicals have maximum detected concentrations less than 10% of the BCL (or ratios above 10). The majority of detected chemicals have very large ratios, indicating that they would not contribute substantially to overall health risk estimates.
- All persistent, bioaccumulative, and toxic chemicals and Class A carcinogens were retained as COPCs, unless their ratio of BCL to maximum detected concentration was greater than 100 (maximum detected concentration is less than 1% BCL), indicating that they would not contribute significantly to overall health risk estimates. All detected carcinogenic PAHs were retained as COPCs.
- There is no BCL for asbestos; however, one or more long chrysotile fibers (>10 microns [µm] in length and <0.4 µm in width) were detected in 3 of 18 samples analyzed for asbestos. Therefore, long chrysotile fibers were identified as a COPC.
- Dioxin was not retained as a COPC, because the maximum detected concentration of dioxin/furan TEQ (795) is below the NDEP recommended default target goal of 1000 pg/g.

- Arsenic was not retained as a COPC because all but one of the measured concentrations were below NDEP-approved remediation target of 7.2 mg/kg, and the remaining detection, which is for a sample collected at 10 ft bgs, was 8.0 mg/kg, only slightly above the remediation target.
- As shown in Table 8, there are no BCLs for several of the detected chemicals, including endrin aldehyde, gamma-chlordane, di-n-octyl phthalate, octachlorostyrene, 1,2,3-trichlorobenzene, platinum, and sodium. The organic chemicals were detected in no more than 3 out of 157 samples at maximum concentrations less than 1 mg/kg; therefore, exclusion of these chemicals is not expected to affect the conclusions of this post-remediation HRA. For the inorganic chemicals, platinum was detected in 7 out of 157 samples at a maximum concentration of 2.4 mg/kg in sample TSB-FJ-02-02-0. Surface soil at this location was scraped because of the presence of asbestos; therefore, the soil represented by this sample has been removed. The next highest detected platinum concentration was 0.15 mg/kg. Sodium was detected in all by one of the 157 samples at a maximum concentration of 2910 mg/kg; however, sodium is an essential nutrient and it was shown to be only slightly elevated above background based on a single statistical test (see Table 5). In such cases, U.S. EPA (1989) guidance suggests that essential nutrients do not need to be considered further in the quantitative risk assessment. Therefore, exclusion of platinum and sodium also is not expected to affect the conclusion of this HRA

It should be noted that, in a few instances, the detection limit was higher than the BCL for one or more chemicals. For example, out of 157 samples analyzed for OCPs, the detection limit for one sample exceeded the BCLs for aldrin and dieldrin and the detection limits for two samples exceeded the BCL for toxaphene (see Table 2 and Table C6 in Appendix C). Given that these chemicals were not detected in any sample and the detection limits for nearly all of the samples were below their BCLs, these few instances of elevated detection limits are not expected to affect the conclusions of this post-remediation HRA. The only other chemicals for which the detection limits exceeded the BCLs were benzo(a)pyrene and dibenz(a,h)anthracene. As discussed in Section 4.2, these values represent PQLs for samples collected in 2007 or 2008, in which the laboratory reviewed the chromatograms and reported the results to the PQL in cases where there was no indication that PAHs were present in the sample.

In summary, based on the background comparison for metals and radionuclides, and the toxicity screen evaluation, the following 14 chemicals are identified as COPCs for the Parcels and are evaluated quantitatively in the post-remediation HRA.

- 4,4'-DDE
- 4,4"-DDT
- Alpha BHC
- Beta BHC
- Benz(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Chrysene
- Hexachlorobenzene
- Aroclor 1248
- Aroclor 1254
- Perchlorate
- Asbestos (long chrysotile fibers)

5.3 Selection of Chemicals of Potential Concern Based on Potential Leaching to Groundwater

COPCs were also selected based on the potential for leaching from soil to groundwater according to the following methodology, which as follows the steps presented in the *Revised Technical Memorandum: Calculation of Leaching-Based, Site-Specific Levels (LSSLs) for the Soil-to-Groundwater Pathway Using NDEP Guidance, Tronox LLC, Henderson, Nevada*, dated November 18, 2010 (Northgate 2010e), as well as the methods presented in NDEP's *Soil to Groundwater Leaching Guidance* (NDEP, 2010d).

- For all detected organic chemicals and detected inorganic chemicals identified as being above background (or for which a background determination could not be made), Site soil concentration data were compared to NDEP leaching-based BCLs (LBCLs), which are calculated using generic default values as input parameters for the soil-water partitioning (SWP) equation based on a Dilution Attenuation Factor (DAF) of 1 or 20 (NDEP, 2010b);

- For chemicals with detected concentrations exceeding the DAF 20 LBCL, site soil concentration data were also compared to leaching-based, site-specific levels (LSSLs), which are calculated using the SWP equation presented in the NDEP guidance, along with Site-specific soil physical properties and chemical-specific DAFs (Northgate, 2010e).

The LSSLs are presented in Attachment 3 of the November 18, 2010 memorandum. All DAFs ranged from approximately 30 to over 700, indicating that use of the DAF 1 is overly conservative for this Site.

Tables 2 and 3 present the number of detections above the LBCLs for organics and inorganics, respectively. Any chemical that was detected at least once above their respective LBCLs, except inorganic chemicals that were shown to be within background, are listed below along with the rationale for including or excluding them as leaching COPCs.

Chemical	**Evaluation**	**Selected as COPC?**
Alpha-BHC	Detected in 7% of the samples. Maximum detected concentration of 0.059 mg/kg is above the LSSL of 0.0022 mg/kg	no- see further discussion below
Beta-BHC	Detected in 34% of the samples. Maximum detected concentration of 0.18 mg/kg is above the LSSL of 0.0017 mg/kg	no-see further discussion below
Gamma BHC (Lindane)	Detected in only 1 out of 157 samples at a concentration of 0.013 mg/kg, which is essentially equal to the LBCL (DAF 20) of 0.01 mg/kg	no
Benzo(a)anthracene	Detected in 2 of 146 samples. The maximum detected concentration of 0.096 mg/kg is below the LBCL (DAF 20) of 1.6 mg/kg	no
Hexachlorobenzene	Detected in 3% of the samples. Maximum detected concentration of 0.0.37 mg/kg is below the LBCL (DAF 20) of 2 mg/kg	no
Acetone	Detected in 27% of the samples. The maximum detected concentration of 1.9 mg/kg is below the LBCL (DAF 20) of 16 mg/kg	no
Methylene chloride	Detected in 14% of the samples. The maximum detected concentration of 0.021 mg/kg is essentially equal to the LBCL (DAF 20) of 0.021 mg/kg	no
Arsenic	Detected in 100% of the samples. The maximum detected concentration of 8 mg/kg is only slightly above the 7.2 mg/kg NDEP recommended comparison level, and is below the LBCL (DAF 20) of 20 mg/kg	no
Chromium (total)	Detected in 100% of the samples. The maximum detected	no

	concentration of 19 mg/kg is below LBCL (DAF 20) of 40 mg/kg.	
Nickel	Detected in 100% of the samples. The maximum detected concentration of 22.6 mg/kg is below the LBCL (DAF 20) of 140 mg/kg.	no
Thallium	Detected in only 3% of the samples. The maximum detected concentration of 0.45 mg/kg is below the LBCL (DAF20) of 8 mg/kg.	no

Although, the maximum concentrations of alpha-BHC and beta-BHC were detected above their respective LSSLs, there is no indication of wide-spread soil contamination that would lead to groundwater impacts based on the relatively few detections of these compounds in the Parcels soil. Additionally, the low concentration detections of beta-BHC are found within all Parcels and not specific to any one area, indicating the lack of a specific source area or areas. Alpha-BHC and beta-BHC groundwater concentrations will be presented and further evaluated as part of the Site-wide groundwater report. Finally, although a LBCL is not available for perchlorate, perchlorate is being addressed as part of the site-wide groundwater and vadose zone evaluation and is therefore not further evaluated in this report.

5.4 Exposure Assessment

The magnitude of exposure for any given receptor is a function of the amount of the constituent in the exposure medium, and the frequency, intensity, and duration of contact with that medium. This section presents the equations and assumptions used to calculate potential exposures for each of the identified COPCs.

5.4.1 Determination of Representative Exposure-Point Concentrations

A representative exposure-point concentration (EPC) is a COPC-specific and medium-specific concentration used in the dose equation for each receptor and each exposure pathway. The methods, rationale, and assumptions employed in deriving the EPCs are discussed below for the relevant environmental media based on the COPCs evaluated in the Parcels.

5.4.1.1 Soil

Soil EPCs were used to estimate direct-contact exposure for future onsite indoor and outdoor commercial workers and construction workers. The soil EPCs were also used to derive airborne particulate concentrations of non-volatile COPCs. For the purposes of this HRA, a screening approach was used that incorporated use of the maximum detected concentration within the 0- to 10-ft bgs interval for each identified COPC, except for asbestos, which is discussed separately

below. This assumption likely overestimates potential health risks, because receptors are unlikely to be exposed to the maximum concentration for all COPCs over an extended period of time.

5.4.1.2 Asbestos

Bulk soil concentrations for asbestos were used to estimate exposure-point concentrations in air according to the methodology described in *Technical Guidance for the Calculation of Asbestos-Related Risk in Soils for the BMI Complex and Common Areas* (NDEP, 2009f). This methodology is based on the protocols described in U.S. EPA (2003a), and requires estimation of asbestos concentrations in soil to develop exposure-point concentrations in air.

Asbestos concentrations in surface soils are based on the number of long fibers (i.e., >10 µm long and <0.4 µm wide) observed in a sample, multiplied by the analytical sensitivity of the measurement:

$$C_{soil} = f \times AS$$

where *f* is the number of long fibers observed (unitless), and *AS* is the analytical sensitivity (fibers per gram [fibers/g]).[11] If more than one asbestos sample is collected, the analytical sensitivity is pooled across the *n* samples as follows:

$$Pooled\ AS = 1 \times \frac{1}{\sum_{i=1}^{n} AS_n}$$

Two estimates of the asbestos concentration were calculated (i.e., a best estimate and an upper-bound estimate), as defined in U.S. EPA's draft methodology (U.S. EPA, 2003a) and NDEP (2009f). The best-estimate concentration is similar to a central-tendency estimate, whereas the upper-bound concentration is comparable to a reasonable maximum exposure estimate. The pooled analytical sensitivity is multiplied by the number of long chrysotile or amphibole structures to estimate concentration. For the best estimate, the number of long fibers measured is incorporated into the calculation above. The upper bound of the asbestos bulk soil concentration is calculated as the 95% UCL of the Poisson distribution, where the mean equals the number of long structures detected. This value is calculated as follows (NDEP 2009f):

$$95\%\ UCL = \frac{\chi^2_{0.95}\left(2 \times (x+1)\right)}{2}$$

[11] The laboratory results are reported as "structures"; however, the term "fibers" is used herein for simplicity.

The 95% UCL of the Poisson distribution is then multiplied by the pooled analytical sensitivity to estimate the upper-bound concentration.

5.4.1.3 Outdoor Dust

Long-term exposure to COPCs bound to dust particles was evaluated using U.S. EPA's particulate emission factor (PEF) approach (U.S. EPA, 2002a). The PEF relates concentrations of a chemical in soil to the concentration of dust particles in the air. The Q/C (Site-Specific Dispersion Factor [U.S. EPA, 2002a]) values are based on the Las Vegas, Nevada, area, as presented in Appendix D of U.S. EPA (2002a). The U.S. EPA guidance for dust generated by construction activities (U.S. EPA, 2002a) was used for short-term construction worker exposures. Input soil concentrations for the model are the EPCs described above. The remaining model input parameters are summarized in Table 10; the calculations, including all intermediate equations, are included in Appendix F of this report. It should be noted that the PEF for short-term construction workers includes two components, emissions from unpaved roads and emissions from wind erosion, excavation, dozing, grading, and tilling (U.S. EPA, 2002a). These sources of dust emissions are combined into a single PEF for short-term construction workers as follows:

$$PEF_{sc\_total} = \frac{1}{\left(\frac{1}{PEF_{sc_{road}}}\right) + \left(\frac{1}{PEF_{sc}}\right)}$$

where:

$PEF_{sc\text{-}total}$ = total subchronic construction-related PEF (m^3/kg)

$PEF_{sc\ road}$ = subchronic PEF for unpaved road traffic

PEF_{sc} = subchronic PEF for construction activities.

For onsite workers, the PEF is limited to emissions from wind erosion from surface soil, which is calculated according to the Equation 24 in NDEP's (2009f) asbestos guidance, as shown in Appendix F.

The air concentration term for COPCs bound to dust particles is derived from soil concentrations (mg/kg for chemicals and fibers/g for asbestos) by applying the PEF values described above in the following equations:

<u>Chemicals</u>

$$C_{air} = C_{soil} \times CF_1 \times \left(\frac{1}{PEF}\right)$$

Asbestos

$$C_{air} = C_{soil} \times CF_2 \times \left(\frac{1}{PEF}\right) \times \left(\frac{1}{CF_3}\right)$$

where:

C_{air}	=	air concentration (µg/m^3, f/cm^3)
CF_1	=	conversion factor (1000 µg/mg)
CF_2	=	conversion factor (1000 g/kg)
CF_3	=	conversion factor (10^6 cm^3/m^3)
PEF	=	particulate emission factor (m^3/kg).

For asbestos, the soil bulk concentrations and air concentrations (and subsequent health risks) were calculated using NDEP's "asbestos guidance riskcalcs.xls" spreadsheet. It should be noted that asbestos bulk soil concentrations and corresponding air concentrations were calculated for each Parcel separately. The approximate size of each area is presented in Table 9.

5.4.2 Exposure Calculations

Reasonable maximum exposures to chemicals were calculated for future onsite indoor and outdoor commercial workers and future onsite construction workers, using the exposure pathway–specific dose equations presented below and the exposure input parameters presented in Tables 10 and 11, respectively. The dose calculation spreadsheets for each exposure scenario are included in Appendix F. The methodology used to estimate the average daily dose (ADD) via each of the complete exposure pathways is based on U.S. EPA (1989, 1992a) guidance. For chemical carcinogens, lifetime average daily dose (LADD) estimates are based on chronic lifetime exposure extrapolated over the estimated average 70-year lifetime (U.S. EPA, 1989), to be consistent with cancer slope factors, which are based on chronic lifetime exposures. For noncarcinogens, ADD estimates are averaged over the estimated exposure period.

5.4.2.1 Chemicals

Soil Ingestion:

$$Dose = \frac{C_{soil} \times SIR \times CF_4 \times EF \times ED \times BIO}{BW \times AT}$$

where:

Dose	=	ADD for non-carcinogens and LADD for carcinogens (mg/kg-day)
C_{soil}	=	chemical concentration in soil (mg/kg)
SIR	=	soil ingestion rate for indoor workers (SIR_i), outdoor workers (SIR_o), or construction workers (SIR_{cw}) (mg/day)
CF_4	=	conversion factor (10^{-6} kg/mg)
EF	=	exposure frequency for indoor workers (EF_i), outdoor workers (EF_o), or construction workers (EF_{cw}) (days/year)
ED	=	exposure duration for commercial workers (ED_w) or construction workers (ED_{cw}) (years)
BIO	=	relative bioavailability (unitless)
BW	=	body weight (kilograms)
AT	=	averaging time (days); equal to the ED × 365 days/year for non-carcinogens (AT_{nc}) and 70 years (average lifetime) × 365 days/year for carcinogens (AT_c)

Dermal Contact:

$$Dose = \frac{C_{soil} \times CF_4 \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

where:

Dose	=	ADD for non-carcinogens and LADD for carcinogens (mg/kg-day)
C_{soil}	=	chemical concentration in soil (mg/kg)
CF_4	=	conversion factor (10^{-6} kg/mg)
SA	=	skin surface area for outdoor workers (SA_o) or construction workers (SA_{cw}) (cm^2/event)

AF = soil to skin adherence factor for outdoor workers (AF_o) or construction workers (AF_{cw}) (mg/cm^2)

ABS = absorption factor (unitless)

EF = exposure frequency for outdoor workers (EF_o) or construction workers (EF_{cw}) (events/year)

ED = exposure duration for commercial workers (ED_w) or construction workers (ED_{cw}) (years)

BW = body weight (kilograms)

AT = averaging time (days); equal to the ED × 365 days/year for non-carcinogens (AT_{nc}) and 70 years (average lifetime) × 365 days/year for carcinogens (AT_c).

Chemical-specific dermal absorption values from U.S. EPA guidance (U.S. EPA, 2004b [Part E RAGS]) are used in the risk assessment.

Inhalation:

The contaminant concentration in air, rather than contaminant intake, is used as the basis for estimating chemical inhalation risks based on guidance described in *Part F, Supplemental Guidance for Inhalation Risk Assessment* (U.S. EPA, 2009b). As presented in the CSM, indoor dust (particulate) is accommodated via the soil ingestion pathway for indoor workers. The inhalation equation for outdoor workers and construction workers is:

$$EC = \frac{C_{soil} \times CF_1 \times ET_o \times EF \times ED}{AT \times PEF}$$

where:

EC = exposure concentration for evaluating exposure to non-carcinogens (EC_{nc}) or carcinogens (EC_c) ($\mu g/m^3$)

C_{soil} = chemical concentration in soil (mg/kg)

CF_1 = conversion factor (1000 $\mu g/m^3$)

ET_o = exposure time outdoors onsite (hr/day)

EF = exposure frequency for outdoor workers (EF_o) or construction workers (EF_{cw}) (days/yr)

ED = exposure duration for commercial workers (ED_w) or construction workers (ED_{cw}) (year)

AT = averaging time (hours); equal to the ED × 365 days/year × 24 hours/day for non-carcinogens (AT_{nc}) and 70 years (average lifetime) × 365 days/year × 24 hours/day for carcinogens (AT_c)

PEF = particulate emission factor (m^3/kg) – see Table 9.

5.4.2.2. Asbestos

Exposure to asbestos fibers in air was evaluated using the methodology described in NDEP (2009f). The NDEP asbestos risk assessment guidance is based on methods for assessing asbestos risk described in U.S. EPA (2003a), and also on associated examples of the implementation of these methods as described in other documents by the authors of U.S. EPA documents (Berman and Chatfield, 1990; Berman and Crump, 1999a,b, 2001; Berman and Kolk, 2000). The exposure equation for asbestos is analogous to that recommended by U.S. EPA for other inhalation carcinogens. The exposure concentration is a function of the asbestos air concentration, the length of time an individual is exposed, and the averaging time for which carcinogenic effects are evaluated for the unit risk factor. The equation for a time-weighted exposure concentration in air used in performing an asbestos inhalation risk assessment is the same as for chemicals:

$$EC_a = \frac{C_{air} \times ET_o \times EF \times ED}{AT}$$

where:

EC_a = exposure concentration for evaluating exposure to asbestos (f/cm^3)

C_{air} = air concentration of asbestos (f/cm^3)

ET_o = Exposure time outdoors onsite (hours/day)

EF = Exposure frequency for commercial workers (EF_w) or construction workers (EF_{cw}) (days/year)

ED = Exposure duration for commercial workers (ED_w) or construction workers (ED_{cw}) (years)

AT = Averaging time (hours); based on 70 years (average lifetime) (AT_c).

As stated previously, potential exposure to asbestos in soil was evaluated for each Parcel.

5.5 Toxicity Assessment

Cancer oral slope factors (SFs), which are expressed in units of $(mg/kg\text{-}day)^{-1}$, or inhalation unit risk factors (URFs), which are expressed in units of $(\mu g/m^3)^{-1}$, are chemical specific and experimentally derived potency values that are used to calculate the risk of cancer resulting from exposure to potentially carcinogenic chemicals. The SF and URF are defined as the 95% UCL of the probability of a carcinogenic response per unit daily intake or concentration of a chemical over 70 years. A higher value implies a more potent carcinogenic potential. Non-cancer oral reference doses (RfDs), which are expressed in units of mg/kg-day, and inhalation reference concentrations (RfCs), which are expressed in units of mg/m^3, are experimentally derived "no-effect" levels that are used to quantify the extent of toxic effects other than cancer due to exposure to chemicals. The RfD and RfC are intended to represent the dose or concentration of a chemical that is not expected to cause adverse health effects, assuming daily exposure over a lifetime, even in sensitive individuals, with a substantial margin of safety. With RfDs and RfCs, a lower value implies a more potent toxicant. These criteria are generally developed by U.S. EPA risk assessment work groups and are listed in the U.S. EPA risk assessment guidance documents and databases.

Table 12 presents the toxicity criteria used in this assessment based on the following hierarchy (based on U.S. EPA, 2003b), with the exception of asbestos, which is discussed separately below:

1. IRIS
2. U.S. EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)
3. National Center for Environmental Assessment (NCEA, or other current U.S. EPA sources)
4. Health Effects Assessment Summary Tables (HEAST)
5. U.S. EPA Criteria Documents (e.g., drinking-water criteria documents, drinking-water Health Advisory summaries, ambient water-quality criteria documents, and air-quality criteria documents)
6. ATSDR toxicological profiles
7. U.S. EPA's Environmental Criteria and Assessment Office (ECAO)
8. Peer-reviewed scientific literature.

For carcinogens, the U.S. EPA weight-of-evidence classification is identified in the table for each carcinogenic COPC. For carcinogenic PAHs (except naphthalene), provisional U.S. EPA guidance for estimating cancer risks was used (U.S. EPA, 1993). The procedure uses

information from the scientific literature to estimate the carcinogenic potency of several PAHs relative to benzo(a)pyrene. These relative potencies are used to modify the SF developed for benzo(a)pyrene for each PAH. Further, U.S. EPA has not derived toxicity criteria to evaluate the potential non-cancer health hazards associated with exposure to the carcinogenic PAHs. Per the HRA Work Plan, a toxicological surrogate (i.e., pyrene) was used to quantify the potential non-carcinogenic effects of the carcinogenic PAHs. This surrogate was selected by NDEP consultants (NDEP, 2006) from a list of six PAHs for which non-cancer oral toxicity criteria have been assigned by the U.S. EPA, based on careful consideration of their relevant toxicity data, target organ(s), dose-response information, and structure-activity relationships. From the available oral non-cancer toxicity data reported by the U.S. EPA, the most sensitive target organs are the liver, kidney, and blood (hematological effects [IRIS], U.S. EPA, 2010; ATSDR, 1990, 1995; ORNL, 1993). For the carcinogenic PAHs, the non-cancer target organs were found to be the same, and the reported toxicological thresholds for these effects are generally in the range of those reported for the non-cancer PAHs (ATSDR, 1995). Although naphthalene (2-ring structure) has the most stringent oral non-cancer toxicity criterion (0.02 mg/kg day), pyrene (4-ring structure; oral RfD of 0.03 mg/kg-day) was selected to be the best surrogate, due to (1) non-cancer toxicity endpoints that are more consistent with those for carcinogenic PAHs; and (2) the greater number of rings in the pyrene chemical structure (NDEP, 2006).

Asbestos risks were assessed in line with the approaches specified in NDEP's (2009f) *Technical Guidance for the Calculation of Asbestos-Related Risk in Soils for the BMI Complex and Common Areas.* The approach relies on exposure-response coefficients that describe the toxicity of different fiber lengths and types of asbestos. These risk coefficients are adopted from the draft, *Technical Support Documents for a Protocol to Assess Asbestos Related Risk* (U.S. EPA, 2003a). The majority of available information indicates that lung cancer and mesothelioma are the most important risks associated with low levels of asbestos (NDEP, 2009f; U.S. EPA, 2003a). Types and aspect ratios (relative length versus diameter) of asbestos fibers differ, and are known to affect the potency of the material; therefore, deriving conclusions regarding the health effects related to asbestos exposure is complex. In the U.S. EPA draft document (U.S. EPA, 2003a), studies from environments with asbestos dusts of differing characteristics were reviewed to evaluate asbestos-related risks. U.S. EPA developed an optimal exposure index, which best reconciles the published literature. The index assigns equal potency to fibers longer than 10 μm and thinner than 0.4 μm, and assigns no potency to fibers of other dimensions. The optimal exposure index also assigns unique exposure-response coefficients for chrysotile and amphibole fibers for the endpoints of mesothelioma and lung cancer. Optimum dose-response coefficients, based on the body of available data, were assumed for this risk assessment. These

coefficients are used to calculate the factor "R," which is defined as the "Estimated Additional Deaths from Lung Cancer or Mesothelioma per 100,000 persons from Constant Lifetime Exposure to 0.0001 TEM f/cc Longer than 10 µm and Thinner than 0.4 µm" (U.S. EPA, 2003a, Table 8-2 combined lung cancer and mesothelioma risk). This factor is calculated as follows (Equation 8-1 of U.S. EPA, 2003a):

$$R = 0.5\left(\left(0.786(NSM + NSF)\right) + \left(0.214(SM + SF)\right)\right)$$

where:

NSM = risk for population of non-smoking males

NSF = risk for population of non-smoking females

SM = risk for population of smoking males

SF = risk for population of smoking females.

"R" is calculated separately for long chrysotile and long amphibole fibers, reflecting the difference in potency between fiber types. Using the values for NSM, NSF, SM, and SF in Table 8.2 of U.S. EPA (2003a), "R" for chrysotile is 0.5693, and "R" for amphiboles is 63.206. "R" is then used to calculate the URF as follows:

$$URF = \frac{10^{-5}}{0.0001} \times R$$

$$= \frac{1}{10} \times R$$

The numerator, 10^{-5}, and the denominator, 0.0001, reflect that the values in Table 8-2 of U.S. EPA 2003a are based on a risk per 100,000 persons exposed to an asbestos air concentration of 0.0001 f/cc. The resulting URFs are 0.05693 for long chrysotile fibers and 6.3206 for long amphibole fibers. These values were used to estimate risks associated with exposure to asbestos in soil at the Site (see Appendix F).

5.6 Risk Characterization

Risk characterization represents the final step in the risk assessment process. In this step, the results of the exposure and toxicity assessments are integrated into quantitative or qualitative estimates of potential health risks. Potential cancer risks and non-cancer adverse health effects

are characterized separately. In addition, potential cancer risks associated with exposure to asbestos are characterized separately for the other carcinogenic chemicals. This section also contains a qualitative discussion of the uncertainties associated with this assessment.

5.6.1 Evaluation of Potential Cancer Risks

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a given chemical at a given concentration. Carcinogenic risks for chemicals are evaluated by multiplying the estimated average exposure rate (i.e., LADD calculated in the exposure assessment) by the chemical's SF or the estimated average exposure concentration (i.e., EC calculated in the exposure assessment) by the chemical's URF. The SF or URF converts estimated LADDs or ECs averaged over a lifetime to incremental risk of an individual developing cancer. According to U.S. EPA (1989), this approach is appropriate for theoretical upper-bound incremental lifetime cancer risks of less than 1×10^{-2}. Lifetime chemical-specific risks and total site risks are estimated as follows:

$$Risk_{oral\ or\ dermal} = LADD \times SF$$

where:

LADD = lifetime average daily dose (mg/kg-d)

SF = cancer slope factor $(mg/kg\text{-}d)^{-1}$

$$Risk_{inhalation} = EC_c \times URF$$

where:

EC_c = exposure concentration for evaluating exposure to carcinogens ($\mu g/m^3$)

URF = unit risk factor $(\mu g/m^3)^{-1}$

and

$$Total\ Site\ Risk = \sum Chemical\ Risk$$

The estimated excess cancer risks for each chemical and exposure route are summed, regardless of the type of cancer associated with each chemical, to estimate the total excess cancer risk for the exposed individual.

For most chemicals, the NDEP point of departure is a cumulative incremental cancer risk of 1×10^{-6} (NDEP, 2010b). U.S. EPA considers 1×10^{-6} to 1×10^{-4} to be the target range for acceptable risks at sites where remediation is considered (U.S. EPA, 1990). Estimates of lifetime excess cancer risk associated with exposure to chemicals of less than one in one million (1×10^{-6}) are considered to be so low as to warrant no further investigation or analysis (U.S. EPA, 1990). It should be noted that cancer risks in the 1×10^{-6} to 1×10^{-4} range or higher do not necessarily mean that adverse health effects will be observed. Current methodology for estimating the carcinogenic potential of chemicals is believed to not underestimate the true risk, but could overestimate the true risk by a considerable degree, and the true risk could be as low as zero.

5.6.1.1 Indoor Commercial Worker

The estimated excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil through incidental ingestion are summarized in Table 13, and the calculation spreadsheets are presented in Appendix F. For an indoor commercial worker, the excess cancer risk due to exposure to chemicals in soil is 5×10^{-7}. Hexachlorobenzene and Aroclor 1254 are the largest contributors to the overall risk. This value is below the lower end of the generally acceptable risk range, indicating that potential exposure to COPCs in soil by an indoor commercial worker should not pose an unacceptable carcinogenic health risk under the conditions evaluated.

5.6.1.2 Outdoor Commercial Worker

The estimated excess cancer risks associated with exposure of an outdoor commercial worker to the COPCs in soil through incidental ingestion, dermal absorption, and inhalation are summarized in Table 13, and the calculation spreadsheets are presented in Appendix F. For an outdoor commercial worker, the excess cancer risk due to exposure to chemicals in soil is 1×10^{-6}. Incidental soil ingestion and dermal contact with soil for hexachlorobenzene and Aroclor 1254 are the largest contributors to the overall risk; inhalation exposure is inconsequential. This value is at the lower end of the generally acceptable risk range, indicating that potential exposure to COPCs in soil by an outdoor commercial worker should not pose an unacceptable carcinogenic health risk under the conditions evaluated.

5.6.1. 3 Construction Worker

The estimated excess cancer risks associated with exposure of a construction worker to the COPCs in soil through incidental ingestion, dermal absorption, and inhalation are summarized in Table 15, and the calculation spreadsheets are presented in Appendix F. For a construction

worker, the excess cancer risk due to exposure to chemicals in soil is 2×10^{-7}. Incidental soil ingestion and dermal contact with soil for hexachlorobenzene and Aroclor 1254 are the largest contributors to the overall risk; inhalation exposure is inconsequential. This value is below the lower end of the generally acceptable risk range, indicating that potential exposure to COPCs in soil by an outdoor commercial worker should not pose an unacceptable carcinogenic health risk under the conditions evaluated.

5.6.2 Evaluation of Non-Cancer Health Effects

Non-cancer adverse health effects are evaluated by comparing the estimated average exposure rate (i.e., ADDs or ECs estimated in the exposure assessment) with an exposure level at which no adverse health effects are expected to occur for a long period of exposure (i.e., the RfDs and RfCs). ADDs and RfDs are compared by dividing the ADD by the RfD to obtain the ADD:RfD ratio, as follows:

$$Hazard\ Quotient_{oral\ or\ dermal} = \frac{ADD}{RfD}$$

where:

ADD = average daily dose (mg/kg-d)
RfD = reference dose (mg/kg-d)

Similarly, ECs and RfCs are compared by dividing the EC by the RfC to obtain the EC/RfC ratio, as follows:

$$Hazard\ Quotient_{inhalation} = \frac{EC_{nc} \times 10^{-3}\ mg/\mu g}{RfC}$$

where:

EC_{nc} = exposure concentration for evaluating exposure to noncarcinogens ($\mu g/m^3$)
RfC = reference concentration (mg/m^3).

A hazard quotient less than or equal to 1 indicates that the predicted exposure to that chemical should not result in an adverse noncarcinogenic health effect (U.S. EPA, 1989). If more than one pathway is evaluated, the hazard quotients for each pathway, for all COPCs, are summed to

determine whether exposure to a combination of pathways poses a health concern. This sum of the hazard quotients is known as a hazard index.

$$Hazard\ Index = \sum Hazard\ Quotients$$

The NDEP non-cancer risk management target is a hazard index (HI) value of less than or equal to 1.0 (NDEP, 2010b). It should be noted that HI or HQ values greater than 1 do not necessarily mean that adverse health effects will be observed, because a substantial margin of safety has been incorporated into many of the RfDs and RfCs.

5.6.2.1 Indoor Commercial Worker

The estimated non-cancer hazard quotients and hazard indices associated with exposure of an indoor commercial worker to the COPCs in soil through incidental ingestion are summarized in Table 13, and the calculation spreadsheets are presented in Appendix F. The total hazard index due to exposure to chemicals in soil is 0.1, indicating that potential exposure of indoor commercial workers to COPCs in soil should not pose a potential noncarcinogenic health risk under the conditions evaluated. Perchlorate is the largest contributor to the overall hazard index.

5.6.2.2 Outdoor Commercial Worker

The estimated non-cancer hazard quotients and hazard indices associated with exposure of an outdoor commercial worker to the COPCs in soil through incidental ingestion, dermal absorption, and inhalation are summarized in Table 13, and the calculation spreadsheets are presented in Appendix F. The total hazard index due to exposure to chemicals in soil is 0.2, indicating that potential exposure of outdoor commercial workers to COPCs in soil should not pose a potential noncarcinogenic health risk under the conditions evaluated. Incidental soil ingestion of perchlorate is the largest contributors to the overall hazard index.

5.6.2.3 Construction Worker

The estimated non-cancer hazard quotients and hazard indices associated with exposure of a construction worker to the COPCs in soil through incidental ingestion, dermal absorption, and inhalation are summarized in Table 14, and the calculation spreadsheets are presented in Appendix F. The total hazard index due to exposure to chemicals in soil is 0.8, indicating that potential exposure of construction workers to COPCs in soil should not pose a potential noncarcinogenic health risk under the conditions evaluated. Incidental soil ingestion of perchlorate is the largest contributors to the overall hazard index.

5.6.3 Asbestos

The equation used to estimate inhalation cancer risk for asbestos is as follows:

$$Risk_{inhalation} = EC_a \times URF$$

where:

EC_a = exposure concentration for evaluating exposure to asbestos (f/cm^3)

URF = unit risk factor (f/ cm^3)$^{-1}$.

As noted in NDEP's (2009f) risk assessment guidance, EC_a is a function of the asbestos air concentration, the length of exposure, and the averaging time. These latter two factors are combined into a "unit risk adjustment factor" (URF adjustment factor) in NDEP's "asbestos guidance risk calcs.xls" spreadsheet, which was used in this HRA. The estimated asbestos air concentrations, URFs, URF adjustment factors, and risks for death from lung cancer or mesothelioma for asbestos exposures to outdoor commercial workers and construction workers are summarized in Table 15, and the calculation spreadsheets are presented in Appendix F.

The upper-bound estimated risks for death from lung cancer or mesothelioma for asbestos exposures to outdoor commercial workers are less than 1×10^{-6} for all of the Parcels (up to 2×10^{-8} for chrysotile and 6×10^{-7} for amphiboles [Parcel D]). For construction workers, the best and upper-bound estimates for chrysotile are less than 1×10^{-6} for all of the Parcels (up to 5×10^{-7} and 7×10^{-7}, respectively [Parcel D]). For amphiboles, the best estimate is zero for all Parcels, and the upper-bound estimates range from 1×10^{-5} (Parcels C, F, G and H) to 3×10^{-5} (Parcel D). It should be noted that the upper-bound risk estimates are based on an observed count of zero long amphibole structures in the 72 samples collected from the Parcels. It should also be noted that the unit risk factors used to estimate risks from asbestos exposure were intended to evaluate constant lifetime exposures, not short-term exposure such as construction activities (U.S. EPA, 2003a). Therefore, these results indicate that exposures to asbestos in soil in the Parcels should not result in unacceptable risks for all future onsite receptors.

5.7 Uncertainty Analysis

Uncertainty is inherent in many aspects of the risk assessment process. Uncertainty generally arises from a lack of knowledge, as well as variability of (1) site conditions and future site use; (2) toxicity and dose-response of the COPCs; and/or (3) the extent to which an individual may be exposed (if at all) to the chemicals. This lack of knowledge means that assumptions must be

made based on information presented in the scientific literature or on professional judgment. Although some assumptions have significant scientific basis, many do not. The assumptions that introduce the greatest amount of uncertainty, and their effects on the findings of this HRA, are summarized in Table 16, and discussed further below. This discussion is qualitative in nature, reflecting the difficulty in quantifying the uncertainty in specific assumptions. In general, assumptions were selected in a manner that purposely biases the process toward health protection.

Uncertainty Associated with Site Characterization Data

Samples cannot be collected from every possible location; therefore, there is always some uncertainty associated with the representativeness of site characterization data. The investigation involved collection of random soil matrix samples placed within a grid across the Parcels. The random sample locations were supplemented with judgment-based sampling locations targeting specific site features and LOUs. The placement of the sample locations was deemed representative to evaluate the soil conditions in the context of the CSM. Because most of the sampling locations were targeted, and samples from these locations were analyzed for the full suite of SRC chemicals, the relative uncertainty in the site characterization data is considered to be low.

The maximum concentration obtained in any of the Parcels was used as the exposure-point concentration to evaluate all Parcels, which is a highly conservative assumption because it is very unlikely that receptors will be exposed to the maximum concentrations of all COPCs in each Parcel over an extended period of time.

Uncertainty Associated with Data Usability/Data Evaluation

A subset of the data was qualified with a *J* qualifier and estimated with low bias. These data were evaluated further to assess potential impact on the risk assessment results. Inclusion of these data is not expected to result in an underestimate of the potential risks associated with residual chemicals in soil at the Site, because (1) the number of affected data points was very small relative to the entire data set, (2) the maximum detected concentration was used as the EPC in the risk assessment calculations, and (3) most of the chemicals identified with a *J* qualifier were not selected as COPCs, because their concentrations were significantly (greater than 100 times) below the BCLs.

With regard to the PAH analysis, it appears that the NDEP-approved DVSRs associated with the initial sampling events in 2007 and 2008 were all reported to the PQL rather than the SQL. This

has little impact on the overall evaluation, because only one soil boring had detections of PAHs, and all confirmation samples were reported as non-detect for PAHs.

Uncertainty Associated with Selection of COPCs

Based on comparison to background, some metals were identified as being above background, and for others, there are insufficient detections in the background and/or site data sets to make a determination. For the majority of these metals, there is no reason to believe they are related to historical Site activities, based on the CSM. Although three radionuclides were identified as being above background, there is no reason to believe that the Parcels have been affected by thorium or uranium isotopes; therefore, no radionuclides were identified as COPCs. In addition to the metals, chemicals detected in at least one sample were included in the COPC selection process. Of these 64 chemicals, 14 were identified as COPCs. For those chemicals that were not selected as COPCs, the maximum detected concentration was generally a factor of 10, if not a factor of 100 or more, lower than the NDEP commercial worker BCL; therefore, exclusion of these chemicals from the quantitative risk assessment may slightly underestimate the potential health risks posed by the site, but to such a small degree as to be inconsequential to the overall results of the HRA. Conversely, some metals may have been selected as COPCs, but may actually be within background.

Uncertainty Associated with Exposure-Point Concentrations

The maximum detected concentration within all the Parcels was used as the EPC for all of the COPCs except asbestos. This assumption likely overestimates potential health risks, because receptors are unlikely to be exposed to the maximum concentration for all COPCs over an extended period of time. With regard to asbestos, two EPCs were calculated—a best estimate and an upper-bound estimate—for each Parcel as a whole. Because no long amphibole fibers were counted in any of the samples, the best estimate is zero. The upper bound of the asbestos bulk soil concentration is calculated as the 95% UCL of the Poisson distribution, where the mean equals the number of long structures detected. This value is then multiplied by the pooled analytical sensitivity to estimate the upper-bound concentration. The 95% UCL of the Poisson distribution for zero fibers counted is three fibers; therefore, for long amphibole fibers, the upper-bound EPC assumes that three long amphibole fibers are present, even though none were actually counted. Therefore, the potential risks associated with exposure to asbestos based on the upper-bound EPCs may be overestimated, particularly for long amphibole fibers.

Uncertainty Associated with Fate-and-Transport Modeling

The fate-and-transport modeling in this HRA is limited to estimating PEFs for construction workers and commercial workers. These values were estimated according to U.S. EPA guidance (2002a) based on a combination of site-specific and default input parameters. For most chemicals, inhalation of dust does not contribute significantly to the overall risk estimates, because exposure via ingestion and dermal contact is much higher; therefore, the uncertainty in this input parameter does not affect the conclusions of the HRA. However, for chemicals such as asbestos, which is evaluated as a carcinogen only through the inhalation route, the potential uncertainty in the PEF contributes substantially to the overall uncertainty in the risk estimate. This is particularly important for the construction worker scenario, because the estimated PEF is large relative to non-construction scenarios. The PEF for construction accounts for several potential sources of dust, including excavating, tilling, and dumping; however, the largest contributor to the overall PEF is driving over unpaved roads. In this case, the majority of the input parameters are based on default values recommended by U.S. EPA (2002a). U.S. EPA provides the basis for most of these values, but not others, including the average weight of the vehicle (8 tonnes) and the number of vehicles that will drive across the area every day (30). The applicability of these and other assumptions to future construction at the Parcels is unknown; however, it is believed that, in combination, these assumptions are more likely to overestimate than underestimate potential health risks, potentially to a significant degree.

Uncertainty Associated with Exposure Assessment

The exposure assessment in this HRA is based on a reasonable maximum exposure (RME) scenario, which is defined by EPA as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site (U.S. EPA, 1989). To achieve this goal, the RME scenario uses highly conservative exposure assumptions. For example, this HRA assumes that a future onsite outdoor commercial worker incidentally ingests 100 mg of site soil per day, 225 days per year, for 25 years. These and other upper-bound, default estimates of exposure most likely overestimate the potential health risks associated with the site. It should be noted, however, that the HRA was limited to direct contact with soil. The potential health risks associated with chemicals in soil vapor were addressed separately for the Tronox site as a whole, including the Parcels. Finally, it should be noted that potential health risks were not evaluated quantitatively for offsite receptors. However, because (1) offsite receptors would be exposed to lower concentrations than onsite receptors, and (2) the estimated health risks for onsite receptors are below levels of concern, potential health risks to offsite receptors would also be below levels of concern.

Uncertainty Associated with Toxicity Assessment

One of the largest sources of uncertainty in any risk assessment is the limited understanding of toxicity to humans who are exposed to the low concentrations that are generally encountered in the environment. The majority of the available toxicity data are from animal studies; these data are extrapolated using mathematical models or multiple uncertainty factors to predict what might occur in humans. Sources of conservatism in the toxicity criteria used in this HRA include:

- The use of conservative methods and assumptions to extrapolate from high-dose animal studies to predict the possible response in humans at exposure levels far below those administered to animals
- The assumption that chemicals considered to be carcinogens do not have thresholds (i.e., for all doses greater than zero, some risk is assumed to be present)
- The fact that epidemiological studies (i.e., human exposure studies) are limited and are not generally considered in a quantitative manner in deriving toxicity values.

In aggregate, these assumptions lead to overestimates of risk, such that the actual risk is unlikely to be higher than the estimated risk, but could be considerably lower and, in fact, could be zero. Chemical-specific uncertainties in toxicity criteria are provided below for chemicals that contribute most to the estimated cancer risks (hexachlorobenzene) and HIs (perchlorate) and asbestos, followed by a discussion regarding chemicals for which route-to-route extrapolations were assumed, surrogate criteria were used, or no criteria were available.

Hexachlorobenzene

The oral slope factor and inhalation unit risk factor for HCB are based on a 2-year chronic feeding study in rats (U.S. EPA, 2010). Significantly increased incidences of kidney and liver tumors were observed in treated animals, and the toxicity criteria were ultimately based on increased liver tumors in females. With regard to their confidence in these criteria, U.S. EPA concluded that significant increases in malignant tumors were observed among an adequate number of animals observed for their lifetime. Additionally, U.S. EPA calculated slope factors from a total of 14 different data sets encompassing three species, four studies, and various endpoints. These values fell within a range of approximately one order of magnitude (U.S. EPA, 2010).

Perchlorate

The oral reference dose for perchlorate is based on a 14-day drinking-water study of adult human volunteers (U.S. EPA, 2010). The critical effect from this study is radioactive iodide uptake inhibition in the thyroid. This is not considered to be an adverse effect; therefore, basing the oral

RfD on this endpoint is a more conservative approach than traditional hazard assessment. U.S. EPA applied an intraspecies uncertainty factor of 10 to the no-observed-effect level (NOEL) to account for differences in sensitivity within the human population. U.S. EPA concluded that their confidence in the oral RfD is high, because it is based on a no-effect level for a well-characterized precursor effect, accompanied by a 10-fold uncertainty factor for susceptible populations (U.S. EPA 2010).

Asbestos

The potential risk associated with exposure to long chrysotile fibers in soil was assessed based on methodology from U.S. EPA (2003a), as specified in NDEP's (2009f) asbestos risk assessment guidance. This methodology distinguishes between different fiber sizes (greater than 10 µm in length and less than 0.4 µm in width) and types (chrysotile and amphiboles). U.S. EPA (2003a) developed two sets of risk coefficients—one set is "optimized" based on the entirety of the available data, and the other set is "conservative" based on data from a single epidemiology study. Per NDEP (2009f) guidance, the optimized risk coefficients were used in this HRA. In addition, the risk coefficients are intended to assess long-term average exposure, such as onsite workers. Applying this methodology to short-term workers such as construction workers, as was done in this HRA, may result in additional uncertainty in the risk estimates (U.S. EPA 2003a).

Uncertainty Associated with Risk Characterization

The uncertainties associated with risk characterization are generally the result of combined uncertainties in the site conditions, exposure assumptions, and toxicity criteria. In this HRA, potential health risks were quantified for future construction workers and future onsite commercial workers associated with direct contact with soil. Given the highly conservative nature of the exposure parameters used to characterize this pathway, especially for the RME scenario, it is highly unlikely that the same receptor would be exposed at that level over the entire duration of exposure. These conservative estimates of exposure were then combined with even more conservative estimates of acceptable exposure (RfD or RfC) or carcinogenic potency (SF or URF) to estimate the magnitude (non-cancer) or likelihood (cancer) of potential effects.

One source of uncertainty that is unique to risk characterization is the assumption that the total risk associated with exposure to multiple chemicals is equal to the sum of the individual risks for each chemical (i.e., the risks are additive). Other possible interactions include synergism, where the total risk is higher than the sum of the individual risks, and antagonism, where the total risk is lower than the sum of the individual risks. Relatively few data are available regarding potential chemical interactions following environmental exposure to chemical mixtures. Some studies

have been carried out in rodents that were given simultaneous doses of multiple chemicals. The results of these studies indicated that no interactive effects were observed for mixtures of chemicals that affect different target organs (i.e., each chemical acted independently), whereas antagonism was observed for mixtures of chemicals that affect the same target organ, but by different mechanisms (Risk Commission, 1997).

While there are no data on chemical interactions in humans exposed to chemical mixtures at the dose levels typically observed in environmental exposures, animal studies suggest that synergistic effects will not occur at levels of exposure below their individual effect levels (Seed et al., 1995). As exposure levels approach the individual effect levels, a variety of interactions may occur, including additive, synergistic, and antagonistic interactions (Seed et al., 1995).

EPA guidance for risk assessment of chemical mixtures (U.S. EPA, 1986) recommends assuming an additive effect following exposure to multiple chemicals. Subsequent recommendations by other parties, such as the National Research Council (1988) and the Presidential/Congressional Commission on Risk Assessment and Risk Management (Risk Commission, 1997), have also advocated a default assumption of additivity. As currently practiced, risk assessments of chemical mixtures generally sum cancer risks regardless of tumor type, and sum non-cancer hazard indices regardless of toxic endpoint or mode of action. Given the available experimental data, this approach likely overestimates potential risks associated with simultaneous exposure to multiple chemicals. It should be noted that asbestos risks were evaluated separately from other chemical risks, consistent with the HRA work plan (Northgate, 2010d). These risk estimates are not additive because of differences in the basis for the carcinogenic toxicity criteria. For chemicals, the SF and URF are defined as the 95% UCL of the probability of a carcinogenic response, whereas the URFs for asbestos are based on the estimated number of additional deaths from lung cancer and mesothelioma.

In summary, these and other assumptions contribute to the overall uncertainty in the results of the HRA. However, given that the largest sources of uncertainty generally result in overestimates of exposure or risk, it is believed that the noncarcinogenic and carcinogenic risks presented in this HRA represent conservative estimates of the risks, if any, posed by residual chemicals at the Site.

5.8 Findings from the Site-Wide Soil Gas HRA

A Site-Wide Soil Gas HRA was prepared to evaluate the potential for adverse health impacts that may occur as a result of potential exposure to chemicals in soil gas via inhalation of vapors in

indoor or outdoor air (Northgate, 2010b). Soil gas data collected in each of the Parcels was included in the HRA.

Soil gas data collected as part of the Phase B Source Area Investigation Soil Gas Survey were evaluated and considered usable for purposes of this HRA. COPCs were selected according to a multi-step process, including a toxicity screen, frequency of detection, and CSM considerations. Based on this process, eight chemicals (benzene, bromodichloromethane, carbon tetrachloride, chloroform, hexachlorobutadiene, naphthalene, tetrachloroethene, and trichloroethene) were selected as COPCs. Risk estimates for all Parcels are at or below 1×10^{-6} and hazard index values are well below 1.

6.0 SUMMARY AND CONCLUSIONS

Analytical results for confirmation soil samples indicate thatParcels C, D, F, G, and H have been successfully remediated consistent with the remediation goals established by the RAW (BEC,2008a) and NDEP, with the exception of inaccessible areas which have been identified in this document. The data demonstrate that the Parcels have been remediated to commercial/industrial standards.

A post-remediation HRA was conducted to evaluate the residual soil and soil-gas chemical concentrations in the Parcels. Soil concentrations were also evaluated for the soil to groundwater pathway. Soil data collected as part of the initial and confirmation sampling efforts were evaluated and considered usable for the purposes of this HRA. The methods and findings from the HRA can be summarized as follows:

Direct Soil Contact

- Based on the CSM for the Parcels, potential exposure to soil was evaluated for future onsite indoor and outdoor commercial workers and future construction workers via direct contact with soil (i.e., incidental ingestion, dermal contact, and inhalation of dust). COPCs were selected according to a multi-step process, including comparisons to background for metals and radionuclides, a toxicity screen, frequency of detection, and CSM considerations. Based on this process, 14 chemicals were selected as COPCs.
- Non-cancer hazard indexes and/or theoretical excess cancer risks associated with direct contact with soil were estimated for all of the COPCs except asbestos, based on the maximum detected concentration. The estimated hazard indices and excess cancer risks were equal to or below NDEP's point of departure for non-cancer effects (hazard index of 1) and cancer risks (1×10^{-6}) for future onsite indoor and outdoor commercial workers and future construction workers under the conditions evaluated.
- With regard to asbestos, a best estimate and an upper-bound estimate were calculated. The estimated risks for death from lung cancer or mesothelioma for asbestos exposures to future onsite outdoor commercial workers and construction workers are less than or equal to 1×10^{-6}, except for upper-bound estimates of exposure to amphibole fibers by future construction workers.
- Additional confirmation samples were collected for PAHs in Parcel F. PAHs were not detected in these samples at detection limits below the BCLs. Therefore, inclusion of these data in the risk assessment calculations will not affect the results of this post-remediation HRA.

The results indicate that direct contact with residual chemicals in the upper 10 ft of soil in the Parcels should not result in unacceptable risks for all future onsite receptors.

Soil to Groundwater Leaching

Only two chemicals, alpha-BHC and beta-BHC, were detected at concentrations above their respective LSSLs; however, there is no indication of wide-spread soil contamination that would lead to groundwater impacts based on the relatively few detections of these compounds in the Parcels soil. A LBCL is not available for perchlorate; however, this chemical is being addressed as part of the site-wide groundwater and vadose zone evaluation.

Soil Gas

Soil gas samples collected in the Parcels were evaluated as part of the Site-Wide Soil Gas Risk Assessment (Northgate, 2010b). COPCs in soil gas were selected according to a multi-step process, including a toxicity screen, frequency of detection, and CSM considerations. Based on this process, eight chemicals (benzene, bromodichloromethane, carbon tetrachloride, chloroform, hexachlorobutadiene, naphthalene, tetrachloroethene, and trichloroethene) were selected as COPCs. Excess cancer risks associated with exposure of an indoor commercial worker to the COPCs in soil gas through inhalation of vapors in indoor air at the Parcels are at or below 1×10^{-6}, and hazard index values are well below 1. Based on findings reported in the Site-Wide Soil Gas Risk Assessment, inhalation of vapors in indoor air should not result in unacceptable risks to future indoor commercial workers.

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7.0 REFERENCES

AECOM, Inc. *Revised Phase B Site Investigation Work Plan for Areas I, II, III and IV, Text, Tables and Figures.* Tronox LLC Facility. Henderson, Nevada. December 2008.

AECOM, Inc.; Northgate Environmental Management, Inc.; *Revised Phase B Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada* (QAPP). Revision, July 2009.

Agency for Toxic Substances and Disease Registry (ATSDR). 1990. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. U.S. Department of Health and Human Services, Public Health Service. August.

Basic Environmental Company (BEC). 2007. Phase 2 Sampling and Analysis Plan to Conduct Soil Characterization.

Basic Environmental Company (BEC). 2008a. Removal Action Workplan for Soil, Tronox Parcels "C", "D", "F", "G" and "H" Sites, Henderson Nevada. July 1.

Basic Environmental Company (BEC). 2008b. SAP

Basic Remediation Company (BRC) and MWH. 2005. Health and Safety Plan, BMI Common Areas, Clark County, Nevada. October.

Basic Remediation Company (BRC), ERM, and MWH. 2007. Field Sampling and Standard Operating Procedures (SOP), BMI Common Areas, Clark County, Nevada. August.

Basic Remediation Company (BRC) and Titanium Metals Corporation (TIMET). 2007. Background Shallow Soil Summary Report, BMI Complex and Common Areas Vicinity. March 16.

Basic Remediation Company (BRC), ERM, and MWH. 2007. Field Sampling and Standard Operating Procedures (SOP), BMI Common Areas, Clark County, Nevada. December 3.

Basic Remediation Company (BRC) and ERM. 2008. BRC Quality Assurance Project Plan, BMI Common Areas, Clark County, Nevada. May.

Basic Remediation Company (BRC). 2009. BRC Standard Operating Procedure (SOP) 40. Data Review Validation. Revision 4. May 7.

Berman, D.W., and E.J. Chatfield. 1990. Interim Superfund Method for the Determination of Asbestos in Ambient Air. Part 2: Technical Background Document, Office of Solid Waste and Remedial Response, U.S. EPA, Washington, D.C., EPA/540/2-90/005b, May.

Berman, D.W., and K. Crump. 1999a. Methodology for Conducting Risk Assessments at Asbestos Superfund Sites—Part 1: Protocol. Interim Version. Prepared for U.S. EPA Region 9, February 15.

Berman, D.W., and K. Crump. 1999b. Methodology for Conducting Risk Assessments at Asbestos Superfund Sites—Part 2: Technical Background Document. Interim Version. Prepared for U.S. EPA Region 9, February 15.

Berman, D.W., and K.S. Crump. 2001. Technical Support Document for a Protocol to Assess Asbestos-Related Risk. Prepared for Mark Raney, Volpe Center, U.S. Department of Transportation, 55 Broadway, Kendall Square, Cambridge, MA 02142. Under EPA Review.

Berman, D.W., and A. Kolk. 2000. Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material. May (Revision 1).

Converse Consultants (Converse). 2007. Phase I Environmental Site Assessment [ESA], Approximately 182 Acres, APNs 178-13-601-002,-002, 178-12-101-002, -003, 178-12-201-005, 178-12-601-005, 178-01-401-001, 178-11-501-007, and Portions of 178-12-401-009 & 178-13-101-002, Henderson, Nevada. March.

ENSR Corporation (ENSR). 2005. Conceptual Site Model (CSM). Kerr-McGee Facility, Henderson, Nevada. February.

ENSR Corporation (ENSR). 2008. Phase B Source Area Investigation Work Plan Area II (Central LOUs). Tronox LLC Facility, Henderson, Nevada. May.

Environ. 2003. Risk Assessment for the Water Reclamation Facility Expansion Site, Henderson, Nevada. Prepared for the City of Henderson, Nevada. October.

ERM-West, Inc. (ERM-West). 2008a. Data Validation Summary Report, Tronox Parcels C, D, F, and G Investigation, November 2007, BMI Industrial Complex, Clark County, Nevada. February.

ERM-West, Inc. (ERM-West). 2008b. Data Validation Summary Report, Tronox Parcel H Investigation, January 2008, BMI Industrial Complex, Clark County, Nevada. April.

ERM-West, Inc. (ERM-West). 2009. Data Validation Summary Report, Tronox Parcels C, D, F, G and H Supplemental Investigations-June-July 2008, BMI Industrial Complex, Clark County, Nevada. January 2009.

IUPAC. 1997. Compendium of Chemical Terminology, 2nd ed. (the "Gold Book"). Compiled by A. D. McNaught and A. Wilkinson. Blackwell Scientific Publications, Oxford (1997). XML on-line corrected version: http://goldbook.iupac.org (2006-) created by M. Nic, J. Jirat, B. Kosata; updates compiled by A. Jenkins. ISBN 0-9678550-9-8. doi:10.1351/goldbook. Last update: 2009-09-07; version: 2.1.5. Accessed May 5, 2010.

Neptune and Company. 2007. Guided Interactive Statistical Decision Tools (GISdT). www.gisdt.org.

Nevada Division of Environmental Protection (NDEP). 1996. Nevada Administrative Code Chapter NAC 445A. Adopted Permanent Regulation of the Nevada State Environmental Commission. LCB File No. R119-96.

Nevada Division of Environmental Protection (NDEP). 2006. Technical Memorandum from Teri Copeland and Joanne Otani Fehling to Brian Rakvica, NDEP. Selection of pyrene as a noncarcinogenic toxicological surrogate for PAHS. February 6, 2006.

Nevada Division of Environmental Protection (NDEP). 2008a. Letter to Ms. Susan Crowley, Tronox LLC, from Ms. Shannon Harbour, regarding NDEP Response to *Removal Action Workplan for Soil, Tronox Parcels "C", "D", "F," "G" and "H" Sites, Henderson, Nevada, dated July 1, 2008.* July 2.

Nevada Division of Environmental Protection (NDEP). 2008b. *Meeting Minutes: May 15, 2008 NDEP-TRONOX discussion on investigation results for Parcels C, D, F, G, and H.*

Nevada Division of Environmental Protection (NDEP). 2008c. *BMI Plant Sites and Common Areas Projects, Henderson, Nevada: Statistical Analysis Recommendations for Field Duplicates and Field Splits.* Bureau of Corrective Actions, Special Projects Branch, 2030 East Flamingo Rd, Suite 230, Las Vegas, NV 89119. November 14.

Nevada Division of Environmental Protection (NDEP). 2008d. *BMI Plant Sites and Common Areas Projects, Henderson, Nevada: Detection Limits and Data Reporting.* Bureau of Corrective Actions, Special Projects Branch, 2030 East Flamingo Rd, Suite 230, Las Vegas, NV 89119. December 3.

Nevada Division of Environmental Protection (NDEP). 2008e. Guidance on the Development of Summary Statistic Tables at the BMI Complex and Common Areas in Henderson, Nevada. Bureau of Corrective Actions, Special Projects Branch, 2030 East Flamingo Rd, Suite 230, Las Vegas, NV 89119. December 10.

Nevada Division of Environmental Protection (NDEP). 2009a. NDEP Supplemental Guidance on Data Validation for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada. April 13.

Nevada Division of Environmental Protection (NDEP). 2009b. Guidance for Evaluating Radionuclide Data for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada. February 6.

Nevada Division of Environmental Protection (NDEP). 2009c. Guidance for Evaluating Secular Equilibrium at the BMI Complex and Common Areas. Henderson, Nevada. February 6, 2009.

Nevada Division of Environmental Protection (NDEP). 2009d. *Meeting Minutes: October 7, 2009 NDEP-TRONOX Phase B Area I Meeting*. October 7.

Nevada Division of Environmental Protection (NDEP). 2009e. Significance Levels for The Gilbert Toolbox of Background Comparison Tests, BMI Plant Sites and Common Areas Projects, Henderson, Nevada, prepared by Neptune and Company Inc, 8550 W. 14th Avenue, Lakewood, CO for the Nevada Division of Environmental Protection, Bureau of Corrective

Actions, Special Projects Branch, 2030 East Flamingo Rd, Suite 230, Las Vegas, NV 89119. July

Nevada Division of Environmental Protection (NDEP). 2009f. Technical Guidance for the Calculation of Asbestos-Related Risk in Soils for the Basic Management Incorporated (BMI) Complex and Common Areas, prepared by Neptune and Company Inc, 8550 W. 14th Avenue, Lakewood, CO for the Nevada Division of Environmental Protection, Bureau of Corrective Actions, Special Projects Branch, 2030 East Flamingo Rd, Suite 230, Las Vegas, NV 89119.

Nevada Division of Environmental Protection (NDEP). 2010a. September 2010 Revised Data Usability Guidance, BMI Plant Sites and Common Areas Projects, Henderson, Nevada. September 1.

Nevada Division of Environmental Protection (NDEP). 2010b. User's Guide and Background Technical Document for Nevada Division of Environmental Protection (NDEP) Basic Comparison Levels (BCLs) for Human Health for the BMI Complex and Common Areas. Revision 5-August.

Nevada Division of Environmental Protection (NDEP). 2010c. Letter to Mr. Matt Paque, Tronox LLC, from Ms. Shannon Harbour, regarding NDEP Response to *Background Issues and Determination of Background Dataset for TRX*. August 17.

Nevada Division of Environmental Protection (NDEP). 2010d. Soil to Groundwater Leaching Guidance, BMI Plant Sites and Common Areas Projects, Henderson, Nevada. January 16.

Northgate Environmental Management, Inc. (Northgate). 2010a. Data Validation Summary Report, Parcel "C", "D", "F", "G" and "H" Soil Confirmation, Tronox LLC, Henderson Nevada. June 15.

Northgate Environmental Management, Inc. (Northgate). 2010b. Site-Wide Soil Gas Human Health Risk Assessment, Tronox LLC, Henderson, Nevada. November 22.

Northgate Environmental Management, Inc. (Northgate). 2010c. Response to Nevada Division of Environmental Protection's July 6, 2010 Comments on Data Validation Summary Report, Parcel "C", "D", "F", "G", and "H" Soil Confirmation, Tronox LLC, Henderson, Nevada, dated June 15, 2010. July 21.

Northgate Environmental Management, Inc. (Northgate). 2010d. Health Risk Assessment Work Plan, Tronox Facility, Henderson, Nevada, March 2010.

Northgate Environmental Management, Inc. (Northgate). 2010e. Revised Technical Memorandum: Calculation of Leaching-Based, Site-Specific Levels (LSSLs) for the Soil-to-Groundwater Pathway Using NDEP Guidance, Tronox LLC, Henderson, Nevada. November 18.

NRC. 1998. Chemical Mixtures. National Research Council, National Academy Press, Washington, DC.

Oak Ridge National Laboratory (ORNL). 1993. Toxicity Summary for Pyrene. Chemical Hazard Evaluation Group, Biomedical and Environmental Information Analysis section, Health Sciences Research Division, Oak Ridge, TN, August.

Risk Commission. 1997. Final report, Volume 2, Risk management in regulatory decision-making. Presidential/Congressional Commission of Risk Assessment and Risk Management, Washington, DC.

Seed, J., R.P. Brown, S.S. Olin, and J.A. Foran. 1995. Chemical mixtures: Current risk assessment methodologies and future directions. Regulatory Toxicol. Pharmacol. 22:76–94.

U.S. Environmental Protection Agency (U.S. EPA). 1986. Guidelines for health risk assessment of chemical mixtures. U.S. Environmental Protection Agency, Federal Register 51(185):34104–34025.

U.S. Environmental Protection Agency (U.S. EPA). 1989. Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. U.S. EPA/540/1-89/002. December.

U.S. Environmental Protection Agency (U.S. EPA). 1990. National Oil and Hazardous Substances Pollution Contingency Plan. U.S. Environmental Protection Agency, Federal Register 55:8666.

U.S. Environmental Protection Agency (U.S. EPA). 1992a. Guidelines for Exposure Assessment. Federal Register, 57(104):22888-22938. May 29.

U.S. Environmental Protection Agency (U.S. EPA). 1992b. Guidance for Data Usability in Risk Assessment. Part A. Office of Emergency and Remedial Response, Washington D.C. Publication 9285.7-09A. PB92-963356. April.

U.S. Environmental Protection Agency (U.S. EPA). 1992c. Guidance for Data Usability in Risk Assessment. Part B. Office of Emergency and Remedial Response, Washington D.C. Publication 9285.7-09B. PB92-963362. May.

U.S. Environmental Protection Agency (U.S. EPA). 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. Office of Research and Development, Washington, DC. EPA/600/R-93/089. July.

U.S. Environmental Protection Agency (U.S. EPA). 1996. Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response, Washington, DC. U.S. EPA/540/R-96/018. April.

U.S. Environmental Protection Agency (U.S. EPA). 1997. Exposure Factors Handbook. Office of Research and Development, Washington DC. U.S. EPA/600/P-95/002Fa-c. August.

U.S. Environmental Protection Agency (U.S. EPA). 1999. *Contract Laboratory Program, National Functional Guidelines for Organic Data Review*. Office of Solid Waste and Emergency Response. October 1999.

U.S. Environmental Protection Agency (U.S. EPA). 2000. Soil Screening Guidance for Radionuclides. Office of Radiation and Indoor Air, Washington, DC. U.S. EPA/540-R-00-007 and U.S. EPA/540-R-00-006.

U.S. Environmental Protection Agency (U.S. EPA). 2001. Office of Solid Waste and Emergency Response. Contract Laboratory Program, National Functional Guidelines for Low Concentration Data Review. June.

U.S. Environmental Protection Agency (U.S. EPA). 2002a. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response, Washington, DC. OSWER 9355.4-24. December.

U.S. Environmental Protection Agency (U.S. EPA). 2002b. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites. Office of Emergency and Remedial Response, Washington, DC. EPA 540-R-01-003. September.

U.S. Environmental Protection Agency (U.S. EPA). 2003a. Technical Support Document for a Protocol to Assess Asbestos-Related risk. Final Draft. Office of Emergency and Remedial Response, Washington, DC. EPA #9345.4-06.October

U.S. Environmental Protection Agency (U.S. EPA). 2003b. Memorandum on Human Health Toxicity Values in Superfund Risk Assessments, from Michael B. Cook, Director, Office of Superfund Remediation and Technology Innovation to Superfund Remediation Policy Managers, Regions 1 - 10, dated 5 December. OSWER Directive 9285.7-53.

U.S. Environmental Protection Agency (U.S. EPA). 2004a. Office of Solid Waste and Emergency Response. Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review. October.

U.S. Environmental Protection Agency (U.S. EPA). 2004b. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Office of Emergency and Remedial Response, Washington, DC. EPA/540/R/99/005. July.

U.S. Environmental Protection Agency (U.S. EPA). 2005a. Test Methods for Evaluation Solid Waste Physical/Chemical Methods (SW-846), Third Edition. July.

U.S. Environmental Protection Agency (U.S. EPA). 2005b. Office of Emergency and Remedial Response. Contract Laboratory Program Statement of Work for Chlorinated Dibenzo-p-dioxin and Chlorinated Dibenzofuran: Mult-imedia, Multi-concentration. January.

U.S. Environmental Protection Agency (U.S. EPA). 2008. Office of Solid Waste and Emergency Response. Contract Laboratory Program, National Functional Guidelines for Organic Data Review. June 2008.

U.S. Environmental Protection Agency (U.S. EPA). 2009a. Office of Solid Waste and Emergency Response. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. January 2009c.

U.S. Environmental Protection Agency (U.S. EPA). 2009b. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) Final. EPA-540-R-070-002. January.

U.S. Environmental Protection Agency (U.S. EPA). 2010. Integrated Risk Information System. U.S. EPA on-line database: http://www.epa.gov/iris/index.html. Accessed November 2010.

Appendix D

Qualifications of Environmental Professionals

Allan J. DeLorme, PE

EDUCATION

1985 MSE., Environmental Engineering, University of Michigan

1984 BS, Civil Engineering, Northeastern University

REGISTRATIONS & CERTIFICATIONS

Registered Professional Engineer; Maryland (Certification Number 19906)

Registered Professional Engineer; Arizona (Certification Number 48972)

EXPERIENCE

Allan Delorme is a Managing Principal of ENVIRON's West Coast Business Unit and is one of five Regional Practice Managers (RPM) for the company's US due diligence practice area. He has over 20 years of consulting experience primarily directed toward: 1) environmental due diligence and compliance assessments associated with corporate mergers and acquisitions, property transfer and redevelopment, and corporate auditing programs; 2) providing assistance to regulated industries with respect to compliance with federal, state and local environmental regulations; 3) the assessment of liabilities associated with contaminated sites for the development of private cost-recovery actions and insurance policyholder claims; 4) development of corrective action plans under state and federal regulatory programs; and 5) analysis and design of ground water and industrial wastewater treatment processes. He has extensive experience in providing consulting services to major corporations in numerous industrial sectors including: chemicals and petrochemicals, textiles, and primary metal manufacturing; electric and gas utilities; water, wastewater, and waste management services; and commercial aviation. The following are representative examples of his experience.

- In his role as RPM, Allan has responsibility for managing the company's environmental due diligence operations in Northern California. Responsibilities include the recruitment and training of staff, coordination and delegation of work assignments, quality assurance/quality control of project deliverables, and new business development. During his fifteen-year tenure at ENVIRON, Allan has personally conducted assessments at several hundred sites ranging from small commercial properties to large complex manufacturing facilities in virtually every industrial sector. He has particular expertise in the following industries: 1) chemicals and petrochemicals; 2) oil and gas production, processing and transmission; 3) electric power generation; 4) integrated manufacturing (e.g., automobiles, steel, aviation); and 5) water and wastewater utilities. The majority of these assessments have included the development of potential response costs associated with soil, groundwater, or surface water contamination, as well as the evaluation of facility compliance with environmental regulations and permitting requirements, the identification of necessary capital upgrades required to achieve or maintain such compliance, and the potential economic effects of future regulatory initiatives.
- Allan has directed multi-site due diligence assessments for a number of commercial carriers and contract aviation operations (fueling and maintenance) that have included facilities at many of the major international airports within the United States. These assessments have included the identification and assessment of soil and ground water contamination issues, as well as issues related to compliance with applicable federal, state and local environmental regulations. Allan also directed additional assignments with contract operators in development and implementation of a comprehensive environmental compliance program at their domestic facilities.

- Allan has directed detailed multi-site liability assessments and cost estimates for policyholders in numerous insurance coverage cases. Policyholders have included several major petrochemical producers, electric and gas utilities, and heavy equipment manufacturers. Assessments included the development of site-specific remedial plans and cost estimates for manufactured gas plants, ash ponds, industrial lagoons, and industrial/hazardous waste landfills.
- Allan developed a response cost allocation scheme under CERCLA for a former manufactured gas plant site owned by an electric and gas utility. The site had an approximately 150-year manufacturing history including iron and steel production, coke and coke byproducts production, and manufactured gas production. The allocation scheme was used in litigation by the utility against various former owners/operators of the site.
- Allan directed an integrated site characterization and risk assessment program at a former chemical manufacturing complex for purposes of property redevelopment/reuse. The site had a 50-year history of chemical manufacturing and waste disposal operations including those related to products such as sodium perchlorate, organochlorine and organophosphorus pesticides, and various refined metals.
- Allan developed a remedial action plan and a detailed assessment of liabilities for a former chemical manufacturing facility and manufactured gas plant which were the subject of cost recovery litigation. The remedial action plan addressed soil and ground water contamination by organic and inorganic constituents, off-site migration to adjacent surface waters, and potential human exposure pathways.
- Allan provided consultation to attorneys for a chemical manufacturer regarding potential liabilities and remedial action requirements at a formerly owned property. Tasks included the assessment of potential remedial action costs, development of allocation schemes, and the preparation of settlement offers.
- Allan developed and implemented a comprehensive plan for the pretreatment of process wastewater at a metal finishing facility. As part of the plan implementation, Allan negotiated revised effluent discharge limits with the local regulatory authority.

In addition to his duties at ENVIRON, Allan has served as a Lecturer at Johns Hopkins University where he has taught graduate-level courses in process design for water and wastewater treatment.

Prior to joining ENVIRON, Allan held the following positions:

Senior Environmental Engineer, Swidler & Berlin

- In-house technical consultant at a law firm specializing in insurance litigation and settlement on behalf of corporate policyholders with contaminated industrial sites. Allan was responsible for directing all technical aspects of claim development including site regulatory analysis and projections of future Agency requirements, constructing cost estimates for potential future response actions, and presenting the technical components of the claim in settlement negotiations. During his tenure, Allan directed the technical component of several large multi-site claims for clients including multinational oil and gas producers, petrochemical manufacturers and electric power generators.

Process Engineer, McNamee, Porter & Seeley

- Designed and conducted pilot-plant studies for the design of industrial wastewater and hazardous waste treatment processes. Developed integrated treatment schemes and design parameters for physicochemical and biological unit operations.

- Conducted performance analyses of industrial and municipal wastewater treatment facilities for regulatory compliance with applicable NPDES statutes and Industrial Pretreatment Program (IPP) requirements.
- Tested and implemented innovative technologies for industrial wastewater treatment including effluent ozonation, fixed-film biological reactors, microbial selectors, and biological nutrient removal.
- Designed and implemented bench-scale treatability studies for industrial wastes to test the efficacy of physicochemical and biological treatment technologies.

Research Associate, University of Michigan

- Designed and conducted a research program for the analysis of transient conditions in anaerobic reactors pertinent to industrial and municipal waste treatment.
- Performed experimental studies to assess the biodegradation of organic contaminants in the environment.

PROFESSIONAL AFFILIATIONS & ACTIVITIES

Member, American Institute of Chemical Engineers, Environmental Division

Member, Tau Beta Pi, National Engineering Honor Society

Member, Chi Epsilon, National Civil Engineering Honor Society

PUBLICATIONS & PRESENTATIONS

DeLorme, A.J. 2009. Recent Developments in Vapor Intrusion, ASTM Standard 2600-08, Orange County Bar Association. February 5.

DeLorme, A.J. and J. Louie. 2003. Perchlorate: The New MTBE? An Introduction to Perchlorate Fate Transport and Remediation, San Francisco Bar Association, May 28.

DeLorme, A.J. and J.S. Schlesinger. 2000 Environmental Due Diligence for Business Transactions. Chapter 1 in New Solutions to Environmental Problems in Business and Real Estate Deals. Practising Law Institute.

DeLorme, A.J., and R.B. Kapuscinski. 1994. Metabolic Processes. Chapter 6 in Wastewater Biology: The Life Processes. Water Environment Federation.

DeLorme, A.J., and S.J. Kang. 1992. Integrated processes for nutrient control. Chapter 15 in MOP-8, Design of Municipal Wastewater Treatment Plants. Water Environment Federation.

DeLorme, A.J., and R.B. Kapuscinski. 1990. On performing experimental studies on transient states of continuous-flow methanogenic reactors. Biotech. & Bioeng. 35:746-750.

DeLorme, A.J., T.S. Nielsen, M.S. Morris, and G. Ganapathi. 1990. Biological treatment of hazardous wastes. Chapter 5 in MOP FD-18, Hazardous Waste Treatment Processes. Water Pollution Control Federation.

DeLorme, A.J., S.J. Kang, C.J. Englert, and C.D. Fifield. 1989. Anoxic selector for filamentous bulking control, BOD removal and nitrification of paper mill wastewater. In Proceedings of the 44th Industrial Waste Conf., Purdue University. Ann Arbor, Michigan: Lewis Publishers, Inc.

DeLorme, A.J., S.J. Kang, T.J. Astfalk, D. Jenkins, and W. Bailey. 1989. Biological nutrient removal at the Blue Plains Wastewater Treatment Plant. Water Pollution Control Federation Annual Conference, Oct. 14-19.

Wendy A. Seider

EDUCATION

2000 BS, Environmental Engineering, Harvard University

REGISTRATIONS AND CERTIFICATIONS

OSHA 40-hour Hazardous Waste Operations Training

Nevada Certified Environmental Manager

EXPERIENCE

Ms. Seider is a Senior Manager at ENVIRON Corporation. She has nine years of work experience with ENVIRON. Her work here has focused primarily on compliance assessment and assistance and environmental due diligence. Specific projects have included:

- Conducted due diligence environmental assessments of more than 150 industrial, manufacturing, and commercial facilities throughout the United States and Canada to assess any on- or off-site environmental liabilities that may be associated with either past or current operations conducted at each site. Inspected sites and interviewed personnel to evaluate facility compliance with federal and state regulatory requirements regarding air, water, and soil pollution, hazardous materials and waste management, and occupational safety and health. Sites visited have included: power plants, waste-to-energy facilities, oil and gas exploration and production related facilities, metal foundries, fiberglass manufacturers, chemical plants, cement plants, steel mills, waste processing facilities, printers, a sugar refinery, metalworking facilities, pharmaceutical and food manufacturers, recreational facilities, maintenance shops, and numerous other operations.
- Managed on-site full-time environmental staff for a pharmaceutical research and development facility. Oversaw staff day-to-day activities and longer term projects, addressed compliance problems as they arose, participated in agency inspections and meetings with contractors related to environmental matters, and provided periodic updates to regional environmental, health, and safety officer. Associated with the project, performed detailed compliance audits at the facility focusing on hazardous and biomedical waste management, hazardous material management, wastewater and storm water discharges, and air permit compliance.
- Managed the performance of comprehensive compliance audits of 50 vehicle oil change facilities located throughout California. Prepared a detailed audit protocol, inspected sites, interviewed facility personnel, and performed a detailed evaluation of the facilities' compliance with federal, state, and local regulatory requirements primarily related to waste management, chemical storage and usage, wastewater discharges, air emissions, and health and safety.
- Performed a high-level audit of environmental programs in place at a nationwide telecommunications company with regards to waste management, underground storage tanks, and employee training programs. The company maintained thousands of remote locations that were coordinated through a central command. Audit was performed to comply with a Consent Judgment issued by the California Department of Toxic Substances Control.
- Performed comprehensive compliance audits focused on management of hazardous waste and hazardous materials at two large campuses operated by a pharmaceutical manufacturer. Following completion of the audits and preparation of summary reports, provided consulting services to assist the facilities in attaining and maintaining compliance.

- Prepared site-specific regulatory compliance guides and detailed waste management guides for a transportation company operating at a number of facilities throughout Southern California.
- Assisted a chemical manufacturing facility in identifying potentially hazardous waste streams and characterizing these streams based on California-specific hazardous waste and extremely hazardous waste criteria.
- Performed detailed compliance audits of a number of facilities and operations such as fiberglass manufacturing, snack production, wineries, printing, and semiconductor fabrication.
- Assisted a multi-national semiconductor company in developing environmental, health, and safety standards and in preparing self-audit checklists for conformance with standards and compliance with regulatory obligations. Checklists were developed for numerous facilities in the United States and Asia and were used to perform detailed third-party compliance audits at select facilities.
- Planned, coordinated, and conducted site characterization and field investigations involving impacted soil and ground water. Tasks included scope of work development, coordination and scheduling of subcontractors, development of sampling and health and safety plans, oversight of field activities, observation and documentation of field activities, sampling of environmental media for laboratory analysis, evaluation and interpretation of data, preparation of reports documenting the investigations, project cost estimate and management of project budgets.
- Managed the performance of a comprehensive, non-intrusive baseline environmental review to identify contamination risks at an active pharmaceutical manufacturing facility. Included performance of an underground sewer line investigation.
- Provided a high-level review of environmental programs associated with a nationwide stevedoring operation. Recommendations were provided related to corporate organization structure and staffing, communication systems, specific environmental programs and procedures, internal inspections/auditing, employee training, continual improvement, and the company's environmental policy statement.
- Prepared Spill Prevention, Control, and Countermeasure (SPCC) Plans for crane rental facilities, pharmaceutical manufacturing facilities, and warehousing/transportation facilities.
- Prepared Hazardous Material Business Plans (HMBPs) for a number of facilities in the pharmaceutical and transportation sectors.
- Conducted tenant exit audits of a number of biotechnology laboratories for a real estate company to assess whether the tenants' operations caused adverse environmental impacts to the property and to determine whether testing is necessary to assess such potential impacts.
- Provided technical support in litigation cases including insurance related lawsuits, environmental justice, and class action suits. Specific projects included research and analysis pertaining to potential disparate and adverse impacts of a concrete manufacturing facility in an environmental justice claim, and assessing the likelihood and potential pathways of contamination to a public water supply well by a chemical manufacturing facility.
- Provided technical litigation support in cost recovery actions involving chemical manufacturing, paper mills, and capacitor manufacturing facilities. Responsibilities included document review, preparation of detailed fact sheets, and assisting in remedial cost estimation.
- Performed asbestos surveys at commercial and industrial facilities.

Wendy A. Seider

Prior to joining ENVIRON, Ms. Seider served as an engineer with the Remediation Group at GZA GeoEnvironmental, Inc. in Newton, Massachusetts. Her experience there included the following:

- Performed operations and maintenance (O&M) activities on remediation systems, including high vacuum extraction (HVE), soil vapor extraction (SVE), air sparging, bioremediation, and blower technologies. O&M activities included system adjustments and repairs, ground water sampling, air sampling, data analysis, and permit submissions.
- Oversaw construction of remediation systems, including HVE technology and blower systems. Project responsibilities included day-to-day oversight, soil and air sampling, on-site health and safety, and record keeping.
- Provided technical support for remedial projects, including cost estimation, plume delineation, and assessment of remedial alternatives.