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Nevada Environmental Response Trust
Henderson, Nevada

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Prepared by
Ramboll Environ US Corporation
Emeryville, California

Date
March 24, 2017

REMEDIAL PERFORMANCE GROUNDWATER SAMPLING AND ANALYSIS PLAN

NEVADA ENVIRONMENTAL RESPONSE TRUST SITE HENDERSON, NEVADA

Ramboll Environ
2200 Powell Street
Suite 700
Emeryville, CA 94608
USA
www.ramboll-environ.com

RAMBOLL ENVIRON

Remedial Performance Groundwater Sampling and Analysis Plan

Nevada Environmental Response Trust Site
(Former Tronox LLC Site)
Henderson, Nevada

Nevada Environmental Response Trust (NERT) Representative Certification
I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of NERT. Based on my own involvement and/or my inquiry of the person or persons who manage the system(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

not individually but solely as President

Signature: Jay A Steinberg, ________________, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

Name: Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

Title: Solely as President and not individually

Company: Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Date: 3/13/17

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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.

__________________________________ ____3/13/17_________________________

John M. Pekala, PG Date
Senior Manager

Certified Environmental Manager
Ramboll Environ US Corporation
CEM Certificate Number: 2347
CEM Expiration Date: September 20, 2018

The following individuals provided input to this document:

John M. Pekala, PG
Allan J. DeLorme, PE
Christopher J. Ritchie, PE
Kristin Drucquer
Craig Knox
Kate Logan, MPA
Katie Linscott, MS
Emily Gilson, MSE
Thomas Winger

Date	**March 24, 2017**
Prepared by	**Ramboll Environ**
Description	**Remedial Performance Groundwater Sampling and Analysis Plan**

Project No **21-41400A**

Ramboll Environ
2200 Powell Street
Suite 700
Emeryville, CA 94608
USA
T +1 510 655 7400
F +1 510 655 9517
www.ramboll-environ.com

RAMBOLL ENVIRON

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ACRONYMS AND ABBREVIATIONS

AWF	Athens Road Well Field
CEM	Certified Environmental Manager
COC	chain of custody
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
DTW	depth to water
EB	equipment blank
EDD	Electronic Data Deliverable
Envirogen	Envirogen Technologies, Inc.
FB	field blank
FD	field duplicate
FGD	field guidance document
ft	feet
ft bgs	feet below ground surface
GWETS	groundwater extraction and treatment system
GWMO Plan	Groundwater Monitoring Optimization Plan
IWF	Interceptor Well Field
L	liters
mg/L	milligrams per liter
mL	milliliters
mL/min	milliliters per minute
mS/cm	milliSiemens per centimeter
mV	millivolts
NDEP	Nevada Division of Environmental Protection
NERT	Nevada Environmental Response Trust
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity units
ORP	oxidation reduction potential
PM	project manager
psi	pounds per square inch
PVC	polyvinyl chloride

QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
Ramboll Environ	Ramboll Environ US Corporation
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SOP	standard operating procedure
Site	Nevada Environmental Response Trust Site
SWF	Seep Well Field
TAT	turnaround time
TestAmerica	TestAmerica Laboratories, Inc.
Tetra Tech	Tetra Tech, Inc.
TB	trip blank
TDS	total dissolved solids
Trust	Nevada Environmental Response Trust
uS/cm	microSiemens per centimeter
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

1. INTRODUCTION

On behalf of the Nevada Environmental Response Trust (NERT or the Trust), Ramboll Environ US Corporation (Ramboll Environ) has prepared this *Remedial Performance Groundwater Sampling and Analysis Plan* (SAP) to provide guidance for implementing the groundwater monitoring program for the NERT Site (the Site) located in Henderson, Nevada. A revised groundwater monitoring program was presented in the *2016 Groundwater Monitoring Optimization Plan* (2016 GWMO Plan [Ramboll Environ 2016]), and approved by the Nevada Division of Environmental Protection (NDEP) on June 24, 2016. The present document, which builds upon the 2016 GWMO Plan, summarizes the groundwater monitoring program and provides specific information on monitoring well locations, sampling procedures, and quality assurance (QA).

Data collected as part of the monitoring program are primarily used in the preparation of the Annual Remedial Performance Reports for Chromium and Perchlorate (the Annual Performance Reports) and the Semi-Annual Remedial Performance Memoranda for Chromium and Perchlorate (the Semi-Annual Performance Memoranda), which are prepared by Ramboll Environ, reviewed by the Trust, and submitted to NDEP at the end of October and the end of April, respectively. The Annual Performance Reports and the Semi-Annual Performance Memoranda are designed to meet reporting requirements described in the 2011 Interim Consent Agreement between the Trust and NDEP, as modified through the approval of the 2016 GWMO Plan.

The Semi-Annual Performance Memorandum consists of text, tables, and figures focused on remedial performance with respect to established performance metrics. The Semi-Annual Performance Memorandum also contains data deliverables, including analytical laboratory reports, data validation reports, field documentation, and electronic data deliverables (EDDs). The Annual Performance Report, submitted following the comprehensive second quarter monitoring event, expands upon the information included in the Semi-Annual Performance Memorandum and contains additional text, tables, and figures documenting groundwater conditions at the Site and downgradient of the Site, the status of remediation efforts, and a detailed performance evaluation of the Groundwater Extraction and Treatment System (GWETS). The Annual Performance Report also includes a potentiometric surface map and isoconcentration maps for key monitored constituents, including chromium, perchlorate, and total dissolved solids (TDS), in the vicinity of the Site and downgradient of the Site. In addition to performance reporting, groundwater monitoring data is used to support other tasks, including the following: estimating perchlorate mass removal from the environment; adjusting operation of the GWETS to optimize remedial performance; informing the planning and implementation of the Remedial Investigation/Feasibility Study (RI/FS) tasks; and calibrating and refining the groundwater model.

1.1 Objectives

The principal goal of this SAP is to provide a resource documenting the procedures for execution of the following tasks:

1. Implementing the monitoring program and assuring that activities are conducted as planned and are performed on schedule;
2. Supervising the monitoring events as they progress to confirm that the proper wells are sampled/measured and that proper protocols are followed;

3. Reviewing field data as it is generated for accuracy and completeness;
4. Alerting field personnel of any missing and/or anomalous data and developing of corrective actions as necessary; and
5. Delivering the appropriate data deliverables on time, free of omissions, and reasonably free of errors.

1.2 Organization

This SAP is organized as follows:

- Section 1 provides an introduction.
- Section 2 describes the groundwater monitoring program in detail.
- Section 3 describes the roles and responsibilities of various parties for accomplishing all components of the monitoring program.
- Section 4 explains the methods and procedures for completing groundwater monitoring program data collection.
- Section 5 lists the requirements for quality control of field deliverables and laboratory data.
- Section 6 lists steps to correct errors.
- Section 7 provides a summary of the document.
- Section 8 lists citations for key documents referenced in this plan.

2. GROUNDWATER MONITORING PROGRAM SUMMARY

The groundwater monitoring program includes eight monthly events, two quarterly events (generally performed in February and August), one semi-annual event (generally performed in November), and one annual event (generally performed in May). Table 1 summarizes the groundwater monitoring program and lists the sampling frequencies of all analytes at each well. Figures 1, 2, 3, and 4 show the wells that are sampled during the monthly, quarterly, semi-annual, and annual sampling events, respectively.

2.1 Monthly, Quarterly, Semi-Annual, and Annual Monitoring Schedule

A comprehensive summary of the Site's groundwater monitoring schedule is presented in Tables 2 through 5. All monitoring wells are sampled using low-flow sampling techniques. The low-flow sampling procedure, as well as sampling procedures for artesian wells, are further described by the Field Guidance Documents (FGDs) included in Appendix B. Extraction well sampling procedures are maintained by the GWETS Operator in a separate document (Envirogen 2016). Additional methods and procedures are further described in Section 4. All tables described in this document are available in electronic format in Attachment 1.

- **Monthly Monitoring** – As described in Table 2, monthly sampling events include a total of 78 wells (30 are measured for groundwater level only). Unless otherwise approved by the Trust, monthly events may begin as early as the first day of the month and shall conclude by the final day of the month. Samples are collected from all extraction wells[1] in the Interceptor Well Field (IWF), Athens Road Well Field (AWF), and Seep Well Field (SWF) and analyzed for perchlorate, TDS, hexavalent chromium, total chromium, nitrate and chlorate. Wells monitored on a monthly basis are shown in Figure 1.
- **Quarterly Monitoring** – As shown in Table 3, expanded monitoring events are conducted in the first and third quarters (generally in February and August) of each year. Unless otherwise approved by the Trust, quarterly events may begin as early as the first day of the second month of the quarter (February 1 for first quarter and August 1 for third quarter) and shall conclude by the final day of the second month in the quarter. A total of 123 wells are included in the quarterly sampling events (62 are measured for groundwater level only). The quarterly event includes the same samples and analyses included in the monthly event, in addition to several wells sampled due to permitting and Resource Conservation and Recovery Act (RCRA) monitoring requirements, which require additional analyses. Wells associated with the quarterly monitoring event are shown in Figure 2.
- **Semi-Annual Monitoring** – As detailed in Table 4, the semi-annual monitoring event is conducted during the fourth quarter (generally in November) of each year. Unless otherwise approved by the Trust, the semi-annual event may begin as early as November 1 and shall conclude by November 30. A total of 179 wells are included in the semi-annual monitoring event (23 are measured for groundwater level only). All samples are analyzed for perchlorate, total chromium, TDS, nitrate, and chlorate, and

[1] Although ART-6 no longer operates as an extraction well, it is included in the monthly well sampling event for consistency with the enhanced operational metrics.

extraction wells are additionally sampled for hexavalent chromium. Wells associated with the semi-annual monitoring event are shown in Figure 3.

- **Annual Monitoring** – As detailed in Table 5, a comprehensive monitoring event is conducted annually during the second quarter (generally in May) of each year. Unless otherwise approved by the Trust, the annual event may begin as early as April 1 and shall conclude by May 31. A total of 302 wells are included in the annual monitoring event (29 are measured for groundwater level only). Samples are analyzed for perchlorate, hexavalent chromium, total chromium, TDS, nitrate, chlorate, and volatile organic compounds (VOCs) or for a subset of these analytes. Wells associated with the annual monitoring event are shown in Figure 4.

2.2 Well Location Information

The Las Vegas Wash and West Lake Mead Parkway define the northern and southern boundaries of the monitoring area, with a majority of wells located on-Site or downgradient of the Site and west of Pabco Road. Monitoring well locations are shown in Figures 1 through 4, as discussed above. Table 6 includes coordinates, basic construction information, and ownership information for each well.

3. ROLES AND RESPONSIBILITIES

The roles described in this section include those for the GWETS Operator, the Groundwater Sampling Contractor, the Data Manager, and the Analytical Laboratory. As of the date of this document, companies assuming these roles include:

- Envirogen Technologies, Inc. (Envirogen) as the GWETS Operator,
- Tetra Tech, Inc. (Tetra Tech) as the Groundwater Sampling Contractor,
- Ramboll Environ as the Data Manager, and
- TestAmerica Laboratories, Inc. (TestAmerica) as the Analytical Laboratory.

Contact information for these parties is listed in Appendix A. Table 7 provides a summary of responsibilities associated with each role.

3.1 Sampling and Water Level Measurements

3.1.1 Data Collection

The GWETS Operator and the Groundwater Sampling Contractor share responsibility for conducting the groundwater monitoring and sampling activities outlined in this document. The GWETS Operator will perform sampling of extraction wells and the Groundwater Sampling Contractor will perform sampling of monitoring wells, as described in Section 2.[2] The GWETS Operator is also responsible for assisting the Groundwater Sampling Contractor with locating and accessing wells as needed. The Analytical Laboratory is responsible for providing sample containers and coolers for sampling events to the GWETS Operator and the Groundwater Sampling Contractor in addition to providing sample receiving and analytical testing and data reporting services.

The GWETS Operator and the Groundwater Sampling Contractor are each responsible for handling and storage of the samples they collect until the samples and responsibility for sample custody are officially transferred to the laboratory or another party under chain of custody (COC) protocols as described in Section 4.12. The courier from the Analytical Laboratory will sign the COC when they take possession of the samples and will verify that all samples listed on the COC are present.

The GWETS Operator is also responsible for collecting routine samples in support of GWETS operations. These operational samples are not considered to be part of the groundwater monitoring program. As such, the procedures outlined in this document do not apply to collection of operational samples. Procedures for extraction well sampling are described in the Extraction Wells Standard Operating Procedure (SOP) developed by the GWETS Operator (Envirogen 2016).

3.1.2 Data Deliverables

The GWETS Operator and the Groundwater Sampling Contractor will prepare documents summarizing their respective field data and field observations, as well as backup documentation for these activities, as described in Section 4.1. Both the GWETS Operator and the Groundwater Sampling Contractor will complete depth to water (DTW) EDDs (provided in Attachment 2) and Field Parameter EDDs (provided in Attachment 3),

[2] The current division of sampling responsibilities is based on the current groundwater monitoring program and may change based on future direction from the Trust.

which the Groundwater Sampling Contractor will review and correct, if necessary, prior to submittal to the Data Manager.

3.1.3 Data Verification

The Groundwater Sampling Contractor will provide oversight of all field sampling and monitoring activities to verify that they comply with this SAP. The Groundwater Sampling Contractor will verify that purge logs, water sampling field logs, DTW field logs, DTW EDDs, and groundwater sampling field parameters EDDs produced as part of the groundwater monitoring program are complete, have undergone data verification and Quality Assurance/Quality Control (QA/QC) evaluations to verify that deliverables are free of omissions and are reasonably free of errors, and are approved by a Nevada Certified Environmental Manager (CEM). The deliverables produced as part of each monitoring event are described in Section 4.1. The Groundwater Sampling Contractor will also review all documents for consistency between hand-written field logs and EDDs. During this review, the Groundwater Sampling Contractor will verify that all required DTW measurements were taken and all required samples were collected.

The GWETS Operator and the Groundwater Sampling Contractor will work together to communicate all anticipated and unanticipated deviations from the sampling program to the Trust and the Data Manager, as necessary. The Data Manager will contact the Groundwater Sampling Contractor with any questions regarding the monitoring program or data deliverables.

3.2 Laboratory Analyses

3.2.1 Data Collection and Analysis

The Analytical Laboratory is responsible for courier sample pickup and laboratory analysis. Analytical results are reported via pdf report, project-specific EDDs, and the Analytical Laboratory's online data portal.

3.2.2 Data Verification

Data verification evaluates whether a data set is complete, correct, and consistent with program requirements. It is the responsibility of the Analytical Laboratory, under the direction of their own QA Officer and the laboratory project manager (PM), to verify that all analyses are correctly performed and all laboratory data deliverables are consistent with each other, as described in Sections 5.4 and 5.6. The Data Manager will verify that the deliverables provided by the Analytical Laboratory are complete and have undergone data verification.

3.2.3 Data Validation

Data validation evaluates the analytical quality of a data set. The Data Manager will coordinate efforts for data validation, which will be performed by an independent contractor consistent with NDEP and United States Environmental Protection Agency (USEPA) guidance for data validation, as discussed in Section 5. The Data Validator will provide an EDD with data qualifiers, reason codes, and validation level columns appended to the data results.

3.3 Data Management

All analytical and field data will be entered into an EQuIS® database system maintained by the Data Manager. The database will be maintained on a secure, enterprise-level database server that is backed-up regularly. Access to the database will be restricted to authorized users. Responsibilities of the Data Manager include the following tasks: 1) downloading and tracking data as it is generated to assess completeness; 2) coordinating with laboratory and field personnel on data generation and management issues including missing and incorrectly reported data; 3) inputting data into the database and maintaining it in an organized, transparent, and readily accessible manner and in accordance with NDEP requirements; 4) performing QA/QC on the database; 5) coordinating with a third party subcontractor for data validation; and 6) corresponding with the Trust as necessary on groundwater data management issues. The Data Manager will also be responsible for compiling and managing new data collected from implementation of low-flow groundwater sampling, which will be provided to the Data Manager by the Groundwater Sampling Contractor using the EDD format and definitions in Attachment 3.

3.4 Data Evaluation and Reporting

The Data Manager will use the field data collected by the GWETS Operator and the Groundwater Sampling Contractor and verified by the Groundwater Sampling Contractor, as well as Analytical Laboratory results from the Analytical Laboratory, in the preparation of various reports and deliverables. Groundwater monitoring data will be compiled, reviewed, analyzed, presented, and interpreted by the Data Manager in order to describe the dynamic groundwater conditions at the Site and downgradient of the Site. The reviewed data will be used to comply with NDEP requirements for groundwater monitoring and reporting as well as support other tasks relying on groundwater monitoring data, including the following: estimating perchlorate mass removal from the environment; adjusting operation of the GWETS to optimize remedial performance; informing the planning and implementation of RI/FS tasks; and calibrating and refining the groundwater model. Annual Performance Reports and Semi-Annual Performance Memoranda presenting the conclusions of these evaluations will be prepared by the Data Manager and submitted to NDEP. The Data Manager will also provide updates to this SAP as necessary if there are changes to the groundwater monitoring program.

3.5 Monitoring Well Inspection and Maintenance

The GWETS Operator and the Groundwater Sampling Contractor will be responsible for notifying the Data Manager of any well-related maintenance issues with routinely sampled wells on an ongoing basis. The Data Manager will also follow-up with the GWETS Operator and the Groundwater Sampling Contractor if any potential well maintenance issues are identified during the course of data evaluation. The GWETS Operator will implement any necessary repairs and will communicate the nature and timing of the repairs to the Groundwater Sampling Contractor and the Data Manager.

3.6 Corrective Actions

If errors are made during sample collection or DTW measurement, the responsible sampling party (the GWETS Operator or the Groundwater Sampling Contractor) should carry out the appropriate corrective action. Sample collection and DTW measurement errors include, but are not limited to, listing incorrect information on COCs, neglecting to sample wells that should be sampled in a given event, and using incorrect sampling techniques.

If errors are made in field data deliverables, the responsible sampling party should correct the offending deliverables. If the Groundwater Sampling Contractor discovers any errors in data deliverables during data verification, the Groundwater Sampling Contractor will work with the GWETS Operator, as necessary, to rectify the errors before submission to the Data Manager.

If errors in laboratory analysis occur, the Analytical Laboratory should carry out the appropriate corrective actions. The Data Manager is responsible for resolving any issues in the data validation process.

The Data Manager will correct any database errors. If, in reviewing the database, the Data Manager discovers errors that were made during sample collection or lab analysis, the Data Manager will communicate these issues to the responsible party who will rectify the errors.

4. DATA COLLECTION PROCEDURES

This methods and procedures section provides a summary of the field protocols that will be followed as part of the groundwater monitoring program to complement the FGDs provided in Appendix B. These procedures may be modified as necessary over time. NDEP will be notified if significant modifications are made to the procedures described below. Well maintenance and inspection procedures for the wells in this monitoring program are included in the 2016 GWMO Plan (Ramboll Environ 2016).

4.1 Documentation Procedures and Field Deliverables

Records that will be generated during field work include field logs and data sheets, sample COC records, equipment inspection/calibration records, and others as necessary. Units of measure for any field measurements and/or analyses will be clearly identified on the field forms and in notes and logs as necessary. Any deviations from field procedures described below, in addition to general notes on observed well condition, should be documented on field forms and communicated to the Data Manager. The Groundwater Sampling Contractor will review all field data to evaluate the completeness of the field records.

Field records to be completed for each sampling event include:

- **Field daily sign-in log**, to be completed by the GWETS Operator and Groundwater Sampling Contractor daily;
- **Daily maintenance and calibration records**, to be completed by the GWETS Operator and Groundwater Sampling Contractor daily;
- **COC**, to be completed by the GWETS Operator and Groundwater Sampling Contractor for each sample shipment (see Section 4.12);
- **Purge logs**, to be completed in the field by the Groundwater Sampling Contractor when performing low-flow sampling at monitoring wells;
- **Water sampling field logs**, to be completed in the field by the GWETS Operator when collecting samples at extraction wells;
- **DTW field logs**, to be completed in the field by the GWETS Operator and Groundwater Sampling Contractor for water level measurements taken at extraction and monitoring wells;
- **DTW EDD**, to be prepared by the GWETS Operator for all extraction wells measured and by the Groundwater Sampling Contractor for all monitoring wells measured (see Section 4.2);
- **Groundwater sampling field parameters EDD**, to be prepared by the GWETS Operator for all extraction wells measured and by the Groundwater Sampling Contractor for all monitoring wells measured (see Section 4.3);
- **CEM certification,** to be provided by the Groundwater Sampling Contractor for all data collected by the Groundwater Sampling Contractor and the GWETS Operator; and

- **Summary of sampling event**, including but not limited to explanations of any issues encountered during sampling and deviations from established sampling program.

Submittals should include sampling logs or purge logs, alphabetized by well name, and DTW field logs for each well in the sampling event. If a well was not sampled or measured, the field forms for that well should indicate that an attempt was made to sample or measure the well and should explain why the sampling or measurement did not occur. Prior to submission to the Data Manager, the Groundwater Sampling Contractor should review all field deliverables produced by the Groundwater Sampling Contractor and by the GWETS Operator to confirm that all required measurements and samples were collected.

All of the documents listed above should be submitted to the Data Manager in a timely manner. Monthly documents should be submitted to the Data Manager by the 20th of each month (following the month when the data was collected). Quarterly, semi-annual, and annual documents should be submitted to the Data Manager by the last day of each month (following the month when the data was collected). In addition to sending field deliverables and EDDs to the Data Manager, the DTW EDDs and the groundwater sampling field parameters EDDs should be emailed to EmeryvilleLabData@ramboll.com.

4.2 Depth to Water EDD

The table below provides more detailed information on the EDD requirements for DTW measurements mentioned above. A template for the EDD, included as an Excel file in Attachment 2, is directly compatible with the Site's existing database structure and is intended to eliminate multiple rounds of data entry.

For each sampling event, the fields listed in the table below should be populated by the GWETS Operator and the Groundwater Sampling Contractor and verified by the Groundwater Sampling Contractor prior to submittal to the Data Manager. Fields not listed in the table below should be left blank. Wells that could not be measured should also be included in this EDD, though only the well identification, measurement date and time, technician, remark, and task code fields should be completed for these wells.

Column Number	Column Title	Comments
Column A	#sys_loc_code	More commonly referred to as the well ID or well name. This field provides a unique and consistent identifier for each well.
Column B	measurement_date	The measurement date and time. Time is in 24-hour notation.
Column D	historical_reference_elev	The measuring point for water level measurements, typically identical to the top of casing elevation. This field should be left blank, as it will be populated by the Data Manager.
Column E	water_level_depth	The DTW in hundredths of feet. The field should be left blank if no DTW measurement was collected.

Column Number	Column Title	Comments
Column F	water_level_elev	The water level elevation at each well, calculated using historical_reference_elev and water_level_depth data. This field should be left blank, as it will be populated by the Data Manager.
Columns G and H	corrected_depth corrected_elevation	The corrected DTW and corrected groundwater elevation after any necessary corrections, e.g., if corrections were necessary because free product was encountered. These fields are hidden and should generally be left blank unless there is a specific need.
Column J	depth_unit	The unit for DTW measurements, which is generally listed as "ft" for feet below the measuring point. For artesian wells, pressure measurements should be converted from pounds per square inch (psi) to negative ft using the following formula: $ft = 2.307\ ft/psi * measured\ value\ in\ psi$
Column K	technician	The primary field technician responsible for groundwater measurement collection.
Column L	dry_indicator_yn	The dry indicator for a measurement. Insert a "y" for yes (the well was dry) or an "n" for no (the well was not dry). This field should be left blank if no measurement was taken.
Column P	remarks	Optional entry designed to provide information on wells that were not measured. Acceptable values are: "dry", "damaged", "obstructed", "destroyed" or "no access". Well access information should only be included here if field personnel were unable to access a well.
Column U	task_code	Describes the monitoring event for which the measurement was taken (e.g. "Monthly", "Quarterly", "Semi-Annual", "Annual").

4.3 Groundwater Sampling Field Parameters EDD

The field parameters collected during low-flow sampling will be used in the interpretation of geochemical conditions in groundwater. A definition and a template for the field parameters EDD is included as an Excel file in Attachment 3. This template is directly compatible with the Site's existing database structure. The EDD will contain one row per well sampled per sampling event. For each monitoring well sampled using the low-flow sampling technique, only the final stabilized field parameters (the final row listed on the low-flow sampling purge log) should be entered into the EDD. Wells that could not be sampled should also be included in this EDD, though only the well identification, measurement date and time, technician, remark, and task code fields should be completed for these wells.

Note that the field parameters EDD should also be used to submit extraction well field data, even though the extraction wells will not be sampled using the low-flow technique.

For extraction wells, only the well identification, measurement date and time, temperature, conductivity, pH, technician, remark, and task code sections of the field parameters EDD should be completed.

Column Number	Column Title	Comments
Column A	#sys_loc_code	More commonly referred to as the well ID or well name. This field provides a unique and consistent identifier for each well.
Column B	purge_start_time	The purge start date and time. Time is in 24 hour notation. Leave blank for extraction wells.
Column C	purge_stop_time	The purge end date and time. Time is in 24 hour notation. Leave blank for monitoring and extraction wells.
Column D	pump_depth	The pump depth entered in hundredths of feet. Leave blank for extraction wells.
Column E	pump_depth_unit	The unit for pump depth measurements, generally listed as “ft” for feet below the measuring point. Leave blank for extraction wells.
Column F	final_purge_rate	The final purge rate used when stabilization of low-flow parameters was achieved. Leave blank for extraction wells.
Column G	purge_unit	The unit for the final purge rate, generally listed as “ml/min” for milliliters per minute. Leave blank for extraction wells.
Column H	volume_purged	The total volume purged, determined using the methodology outlined in the low-flow groundwater sampling FGD. Leave blank for extraction wells.
Column I	volume_unit	The unit for volume purged, generally listed as “ml” for milliliters or “L” for liters. Leave blank for extraction wells.
Column J	measurement_date	The date and time when stabilization of field parameters was achieved as it is written on the field sheet. For extraction wells, the time of sample collection should be entered. Time is in 24 hour notation. If sampling is attempted and unsuccessful, the date and time of the sampling attempt should be entered. If sampling is not attempted because a well is known to be dry or damaged, the date during the current sampling event when the well’s dry or damaged status was confirmed should be entered.

Column Number	Column Title	Comments
Column K	temperature	The final stabilized temperature measurement as it is written on the field sheet.
Column L	temp_unit	The unit for temperature, generally listed as "celsius".
Column M	pH	The final stabilized pH measurement in standard pH units as it is written on the field sheet.
Column N	conductivity	The final stabilized conductivity measurement as it is written on the field sheet.
Column O	cond_unit	The unit for conductivity, generally listed as "uS/cm" for microSiemens per centimeter or "mS/cm" for milliSiemens per centimeter.
Column P	dissolved_oxygen	The final stabilized dissolved oxygen (DO) measurement as it is written on the field sheet. Leave blank for extraction wells.
Column Q	diss_oxy_unit	The unit for DO, generally listed as "mg/L" for milligrams per liter. Leave blank for extraction wells.
Column R	orp	The final stabilized oxidation reduction potential (ORP) measurement as it is written on the field sheet. Leave blank for extraction wells.
Column S	orp_unit	The unit for ORP, generally listed as "mV" for millivolts. Leave blank for extraction wells.
Column T	turbidity	The final stabilized turbidity measurement as it is written on the field sheet. Leave blank for extraction wells.
Column U	turb_unit	The unit for turbidity, generally listed as "NTU" for nephelometric turbidity units. Leave blank for extraction wells.
Column V	Color	The observed color of the purged water as it is written on the field sheet. For some wells, the color may be "Clear". Leave blank for extraction wells.
Column W	Odor_y_n	Odor indicator. Insert a "Y" for yes (the purged water had an odor) or an "N" for no (purged water did not have an odor). Leave blank for extraction wells.
Column X	technician	The primary field technician responsible for sample collection. If multiple technicians were present,

Column Number	Column Title	Comments
		enter the senior technician considered responsible for sample collection.
Column Y	remark	Optional entry designed to provide information on wells that were not sampled. Acceptable values are: "dry", "damaged", "obstructed", "destroyed" or "no access". This field can also be used to briefly note other anomalies in the sampling/purging procedure.
Column Z	task_code	Describes the monitoring event for which the measurements were taken (e.g. "Monthly", "Quarterly", "Semi-Annual", "Annual").

4.4 Instrument Calibration Procedures

Water quality meters measuring pH, DO, specific conductivity and turbidity meters will require calibration. Equipment that can be field calibrated will be calibrated at least once per day prior to beginning sampling activities, with calibration results documented on an Instrument Calibration Log. Equipment that must be calibrated in a laboratory setting should be used only if a current calibration certificate is available (for example, a calibration certificate is provided with a piece of rental monitoring equipment). Calibration procedures should be consistent with manufacturer instruction manuals for each instrument.

4.5 Decontamination Procedures

Equipment decontamination procedures are described in each of the FGDs included in Appendix B.

4.6 Groundwater Gauging Procedures

The Groundwater and Free Product Level Measurements FGD in Appendix B is applicable to all monitoring wells in the groundwater monitoring program. Measurements of water levels in extraction wells should follow guidelines in the Extraction Wells SOP prepared by Envirogen (Envirogen 2016). Additional manual measurements of DTW in extraction wells equipped with transducers may be required at the direction of the Data Manager or as described in the Extraction Wells SOP. During the second quarter annual event, or more frequently if requested by the Trust, total well depth will also be measured in all wells where DTW is measured following procedures outlined in the Groundwater and Free Product Level Measurements FGD.

It is preferable that all groundwater gauging required by a sampling event be performed prior to any sample collection in as short a timeframe as possible to capture a "snapshot" of groundwater conditions; if there is a single sampling team, they should perform all groundwater gauging before collecting any samples for laboratory analyses. At a minimum, adjacent wells should all be gauged prior to purging any of the wells to prevent inconsistencies in DTW measurements from localized well drawdown. At each well, DTW measurements should be compared to historical data and atypical conditions should be noted. Groundwater elevations in extraction wells tend to vary more than in monitoring wells. If the current measurement differs from the previous measurement by more than two feet, the DTW should be confirmed by additional measurements. Only the final measurement should be entered in the DTW EDD.

DTW measurements should be taken with respect to a consistent measuring point. The measuring point for monitoring wells in the groundwater monitoring program is the top of the PVC (polyvinyl chloride) casing. In some cases, surveyors have made a notch or mark to indicate the location on the PVC casing that was surveyed; when it exists, this notch or mark should be used as the measuring point for DTW measurements. In cases where there is no notch or mark on the PVC casing, the northern edge of the top of the PVC casing should be used as the measuring point. The measuring point on extraction wells may be either the top of PVC casing or a defined access point through which the water level meter may be lowered.

Groundwater samplers should be aware that dense non-aqueous phase liquid (DNAPL) has been detected in monitoring wells screened between 80 and 120 feet below ground surface (ft bgs) near the former Montrose Chemical Corporation of California site, located to the west of the NERT property boundary adjacent to the Unit buildings (AECOM 2016). DNAPL has been encountered within the NERT property boundary at well MC-MW-18 (AECOM 2016); though this well is not included in the groundwater monitoring program, it is located between wells M-123 and TR-4 which are sampled during the annual monitoring event. If DNAPL is encountered during sampling, groundwater samplers should follow the procedures outlined in the Groundwater and Free Product Level Measurements FGD and should notify the Analytical Laboratory and the Data Manager.

4.7 Pressure Transducer Field Procedures

The Trust anticipates deploying approximately 20 pressure transducers in select monitoring wells during first quarter 2017. The initial transducer locations will be chosen based on current project needs, but may change in the future at the direction of the Trust or the Data Manager.

Following initial deployment, the Groundwater Sampling Contractor will visit the transducers once per quarter to collect data from the transducers' data loggers. Contemporaneous with the data downloads, the Groundwater Sampling Contractor will also collect manual DTW measurements at the wells equipped with transducers following the procedure outlined in the Groundwater and Free Product Level Measurements FGD. It is recommended that the Groundwater Sampling Contractor collect transducer data during a scheduled groundwater monitoring program event in order to eliminate the need to visit a transducer-equipped well twice during one sampling event. If a transducer interferes with manual DTW measurements or the collection of samples for laboratory analysis, follow the procedure outlined in Section 4.8 for transducer removal during sampling. The Groundwater Sampling Contractor should continue to take DTW measurements and collect samples at all monitoring wells equipped with transducers according to the schedule outlined in Table 1.

The Groundwater Sampling Contractor will submit the raw transducer data to the Data Manager, along with field daily logs and any additional DTW field logs that were used to record water levels manually during data collection. The Data Manager will review the transducer data and incorporate it into the project database. Data from these transducers will then be evaluated and incorporated into remedial performance reporting efforts by the Data Manager.

4.8 Low-Flow Groundwater Sampling Procedures

The low-flow sampling technique is used for all monitoring wells within the monitoring program. The Low-Flow Groundwater Sampling FGD in Appendix B describes procedures for performing low-flow sampling. As noted in the Low-Flow Sampling FGD, care should be taken to avoid cross-contamination of monitoring wells during sampling. Sampling teams using non-dedicated equipment should begin sampling at the wells generally located in regions with the lowest perchlorate concentrations and move systematically toward the wells generally located in regions with the highest perchlorate concentrations, as reasonably practicable. The sampling order should be determined by the Groundwater Sampling Contractor.

Samples collected for analysis of total chromium should not be filtered in the field or in the lab. Samples collected for analysis of hexavalent chromium should be filtered in the lab using 0.45 micron filters, according to EPA Method 218.6. Samples collected for other metals at the RCRA wells and for the National Pollutant Discharge Elimination System (NPDES) permit should not be filtered in the field or in the lab. Samples collected for perchlorate analysis also should not be filtered; instead, filled containers should contain headspace and should be agitated and immediately chilled to 4ºC. Preservation requirements are listed in Table 8.

Some monitoring wells are equipped with transducers to measure their water levels. Transducers that may be encountered include data loggers coupled with telemetric tubes, in wells near the SWF as of February 2017, and standalone pressure transducers, to be installed in first quarter 2017 at approximately 20 wells distributed across the area covered by the groundwater monitoring program. If a transducer interferes with sampling, procedures outlined in the Groundwater and Free Product Level Measurements FGD should be used to remove the transducer carefully from the well and place it on plastic sheeting adjacent to the well while sampling occurs. After sampling, the transducer should be redeployed in the well at the same depth it was initially deployed taking care to avoid uncoiling or kinking the transducer wires. The times when transducers are removed from wells and redeployed following sampling should be recorded on the low-flow sampling purge log.

4.9 Extraction Well Sampling Procedures

Extraction well sampling is carried out by the GWETS Operator during monthly, quarterly, semi-annual, and annual sampling events as specified in Tables 2-5. Sampling procedures should align with those described in the Extraction Wells SOP prepared by Envirogen (Envirogen 2016). Samples collected at extraction wells for total chromium analysis should not be filtered in the field or in the lab. Samples collected at extraction wells for hexavalent chromium analysis should be filtered in the lab using 0.45 micron filters. Samples collected from extraction wells for perchlorate analysis should not be filtered; instead, filled containers should contain headspace and should be agitated and immediately chilled to 4ºC. Preservation requirements are listed in Table 8.

4.10 Artesian Well Sampling Procedures

The groundwater monitoring program includes six artesian wells: M-155, TR-1, TR-3, TR-5, TR-11, and TR-12. These wells should be sampled according to the procedures described in the Artesian Well Groundwater Sampling FGD included in Appendix B.

4.11 Sampling Designation and Handling Procedures

All samples should be labeled with a sample identifier that includes the well name, the date collected, and the appropriate sample code for QA/QC samples. Guidance regarding sample designation and handling is provided in the Low-Flow Groundwater Sampling FGD and the Artesian Well Groundwater Sampling FGD in Appendix B.

The Groundwater Sampling Contractor and the GWETS Operator will each create COCs for all samples they collect according to procedures in Section 4.12. COCs should be reviewed by the sample collector to make sure sample names and analytes are correctly designated and that all required analyses are listed. Samples collected for the Site's NPDES permit from monitoring well M-10 should be listed on a separate COC.

To discourage tampering during transport, a custody seal will be placed on each cooler after the samples are packed. These consist of a security tape or label with the date and initial of the sampler or person currently in possession of the sample. Receiving personnel at the laboratory will note on the cooler receipt form or an equivalent form whether or not the custody seals are intact.

4.12 Chain of Custody Protocols

Completed original COC forms will be sent with each sample shipment to document the collection and shipment of samples for off-site laboratory analysis. COCs will identify the contents of each shipment and will provide an accurate written record that traces the possession of individual samples from the time of collection in the field until they are accepted at the Analytical Laboratory.

The Groundwater Sampling Contractor and GWETS Operator will record the following information on the chain-of-custody forms:

- Client and project number
- Name or initials and signature of sampler
- Name of destination analytical laboratory
- Name and phone number of PM in case of questions
- Unique sample identifier for each sample
- Data and time of collection for each sample
- Number and type of containers included for each sample
- Analysis or analyses requested for each sample
- Preservatives used, if any, for each sample
- Sample matrix for each sample
- Any filtering performed, if applicable, for each sample
- Signatures of all persons having custody of the samples

- Dates and times of transfers of custody
- Shipping company identification number, if applicable
- Any other pertinent notes, comments, or remarks

Unused lines on the form will be crossed out and initialed.

A sample is considered to be under the control of, and in the custody of, the responsible person if the samples are in their physical possession, locked or sealed in a tamper-proof container, or stored in a secure area.

The person who collects the sample is the initial custodian of the sample. Any transfers are documented on the COC by the individuals relinquishing and receiving the sample, along with their signature, and the date and time of transfer. This transfer must continue until the custody is released to a commercial carrier (i.e. FedEx), or the laboratory (either at the laboratory or to a laboratory employed courier). If relinquished to a commercial carrier, the carrier assumes custody through their shipping receipt. A copy of the shipping receipt should be attached to the COC as a permanent part of the custody control. If the sample is relinquished to a laboratory courier, the courier will then need to relinquish the sample to the stationary laboratory upon arrival. Once the sample has arrived at the stationary laboratory, it must be entered into the sample custody control system of the laboratory. If the sample is further transported to a subcontracted laboratory, the laboratory will produce an internal COC form that will be available upon request. The Analytical Laboratory will provide copies of all completed COCs to the Data Manager.

4.13 Quality Assurance and Quality Control Samples

QC activities are those technical activities routinely performed, not to eliminate or minimize errors, but to assess/demonstrate reliability and confidence in the measurement data generated. Field QA/QC samples that should be collected at monitoring wells and extraction wells include field duplicates (FDs), field blanks (FBs), and equipment blanks (EBs). Trip blanks (TBs) should only be collected at monitoring wells. The Low-Flow Groundwater Sampling FGD describes each of these QA/QC sample types. The conventions for sample naming and identification listed in the Low-Flow Groundwater Sampling FGD should be followed for all QA/QC samples.

EBs, FBs, and FDs in this groundwater monitoring program should be collected at a frequency of one in every 20 primary samples.

TB samples are only necessary during the annual sampling event when samples for VOC analysis are being collected. A TB sample from the Analytical Laboratory should be added to the sample cooler or other shipping container prior to collecting samples for VOCs. The TB sample accompanies the primary samples to the laboratory and is analyzed for VOCs using the same analytical method as the primary samples. When samples for VOC analysis are being collected, one TB will be included with each daily shipment of groundwater samples.

5. QUALITY CONTROL

5.1 Quality Control of Field Deliverables

The quality and accuracy of field data is paramount to remedial performance evaluation. The Groundwater Sampling Contractor will be responsible for reviewing all field data and electronic deliverables for accuracy and completeness prior to submittal to the Data Manager. Field data deliverables are expected to be delivered in a timely manner with no omissions and reasonably free of errors. In the case of field data deliverables, the Groundwater Sampling Contractor will perform data verification and QA/QC and will provide CEM-certified data to the Data Manager. In particular, the Groundwater Sampling Contractor should review all documents for: 1) consistency between hand-written field logs and the DTW and Field Parameters EDDs; 2) large or unexplained changes in DTW; and 3) conditions that could impact future sampling events (e.g., stuck bailer, damaged/inaccessible wells, etc.).

5.2 Quality Control of Laboratory Deliverables

Following groundwater sample submittal to the Analytical Laboratory, the Data Manager will review the Analytical Laboratory's deliverables to verify that: 1) the laboratory is analyzing each sample for the correct analytes; 2) the laboratory provides deliverables equivalent to USEPA Level II; 3) the laboratory provides an EDD in the appropriate format for each sample delivery group (SDG) and; 4) results are delivered in a timely manner with no omissions and reasonably free of errors. Additional information concerning these responsibilities is described below in the following sections. Where inconsistencies in the above are identified, the Data Manager will communicate these directly to the Analytical Laboratory, the GWETS Operator, and/or the Groundwater Sampling Contractor.

5.3 Verification of Analytes

The GWETS Operator and Groundwater Sampling Contractor should review the laboratory acknowledgements, provided by the Analytical Laboratory, to verify that each sample is analyzed for the correct analytes using the correct methods (listed in Table 8) and that no typographical errors were made during sample check-in. The GWETS Operator and Groundwater Sampling Contractor are each responsible for reviewing acknowledgements for samples that they collected and these reviews should occur within 2 days of receipt of the laboratory acknowledgements. Any corrections or changes should be communicated to the Analytical Laboratory immediately for correction and resubmittal of a revised acknowledgment.

5.4 Laboratory QA/QC Program

The laboratory QA/QC program includes 1) performing analytical methods according to prescribed protocols; 2) analyzing laboratory QA/QC samples to measure precision and accuracy of laboratory methods and equipment and instrument calibration; and 3) preventive maintenance. Laboratory QA/QC samples include method blanks, laboratory control samples, matrix spikes, laboratory duplicates, and surrogates. The laboratory will be responsible for assessing data quality and advising of any data rated "preliminary", "unacceptable", or other notations that would caution the data user of possible nonconformance. The Analytical Laboratory's QA Officer will conduct a systematic review of the data for compliance with the established quality control criteria based on laboratory QA/QC sample results and an evaluation of data precision, accuracy, and completeness will be performed.

5.5 Data Reporting Requirements

Laboratory deliverables equivalent to USEPA Level II are required to meet the project's data validation requirement that all data in the groundwater monitoring program be validated to Stage-2A.

5.6 Laboratory EDD Requirements

EDDs provided by the Analytical Laboratory should be in the EQuIS 4-File EDD format as defined by the Ramboll Environ Laboratory EDD Format Specification, EQuIS Edition. The format is provided in Attachment 4. The Analytical Laboratory will check that its EDD submittals are consistent with lists of valid values provided by the Data Manager. Prior to loading into the database, EDDs will be reviewed by the Data Manager for consistency with the file format and valid values. The independent Data Validator will provide an EDD with data qualifiers, reason codes, and validation level columns appended to the data results. Validation information will be included in the EQuIS database, maintained by the Data Manager.

It is the responsibility of the Analytical Laboratory to verify that the pdf reports, electronic data, and data posted through the Analytical Laboratory's website are identical. The data reported in EDDs and in the pdf reports must correspond exactly, including significant digits and units. It is preferable that the pdf report and EDD are generated at approximately the same time from the same data source.

The Data Manager will perform automated data quality checks as data is received from the laboratory and will contact the laboratory promptly if issues with the data are found. In the event that a laboratory report needs to be corrected, the laboratory will provide revised reports, including revised EDDs and data packages.

5.7 Sample Turnaround Time

The standard sample turnaround time (TAT) for this project is ten business days, as indicated in Table 8. All sample deliverables (e.g., COC, sample acknowledgement, laboratory report in pdf, EDD in project-specific format) should be delivered within the standard TAT.

6. CORRECTIVE ACTIONS

Corrective actions should be taken immediately if it is discovered that the integrity of a sample has been compromised. Instances in which corrective actions may be necessary include, but are not limited to the following: sampling an incorrect well; sampling a well using improper equipment and/or technique; filling the incorrect bottle set for a sample; indicating the incorrect analytes on a COC; and exceedance of an analytical hold time.

If samples have not yet been shipped to the Analytical Laboratory when an issue is discovered, the shipment should be canceled. If samples have already been shipped to the Analytical Laboratory when an issue is discovered, the Groundwater Sampling Contractor should contact the Analytical Laboratory and request that all problematic samples or analyses be canceled. If the Analytical Laboratory has already analyzed samples and issued a report when an issue is discovered, the Data Manager may qualify the data as not reportable in the project database. In all cases, problems should be communicated to the Data Manager as soon as possible.

If it is discovered that an error was made on a COC, the party responsible for the error (the GWETS Operator or the Groundwater Sampling Contractor) should work with the Analytical Laboratory to correct the error on the COC and in the associated reports and EDDs, as needed.

In addition to the cancelation or qualification of the compromised samples, re-sampling should occur in order to collect valid samples. If a well is re-sampled for all analytes, only the purge log from the re-sampling event should be included in the submission of field deliverables to the Data Manager. In cases where only certain analyses were compromised for a sample, only the compromised analyses need to be reanalyzed and purge logs from both the initial sampling and the re-sampling event should be submitted to the Data Manager.

If during field form review the Groundwater Sampling Contractor realizes that a required measurement or sample was not collected, they should take the necessary actions to obtain the measurement or sample. If a sample could not be collected due to damage to a well, the damage should be noted on purge logs and/or DTW field logs. The party that discovered the damage should communicate the nature of the damage to the GWETS Operator and the Data Manager. The GWETS Operator will implement all necessary repairs to damaged wells and will report on the nature and timing of repairs to the Groundwater Sampling Contractor and the Data Manager. If damage prevented a well from being sampled and the well is repaired before the end of the sample period in which the damage was discovered, the sample should be collected following repair.

7. SUMMARY

This *Remedial Performance Groundwater Sampling and Analysis Plan* provides guidance for implementing the groundwater monitoring program for the Site, as proposed in the 2016 GWMO Plan, which was subsequently approved by NDEP in a letter dated June 24, 2016. This SAP summarizes the groundwater monitoring program intended to monitor and assess the remedial performance of the GWETS over time and provides specific information on monitoring well locations, sampling procedures, and QA. Data collected as part of the groundwater monitoring program are primarily used in the preparation of the Annual Performance Reports and the Semi-Annual Performance Memoranda, which are prepared by the Data Manager, reviewed by the Trust, and submitted to NDEP at the end of October and the end of April, respectively. Any revisions to this document will be made by the Data Manager as requested by the Trust or as necessary to comply with the Site's groundwater monitoring program and NDEP reporting requirements.

8. REFERENCES

AECOM, 2016. MC-MW-18 DNAPL Mobility Test and DNAPL Monitoring and Purge Program Data Submittal, Montrose Chemical Corporation of California Environmental Conditions Investigation; Henderson, Nevada. June 9. NDEP approved September 8, 2016.

Envirogen Technologies, Inc. (Envirogen), 2016. Extraction Wells SOP. December 13.

Ramboll Environ US Corporation (Ramboll Environ), 2016. 2016 Groundwater Monitoring Optimization Plan, Nevada Environmental Response Trust Site; Henderson, Nevada. April 29. NDEP approved June 24, 2016.

TABLES

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Monitoring Analyses																						Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)							
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level		
AA-01																		X	X	X	X		
AA-11																X		X	X	X	X		[4]
ARP-1											X		X	X	X	X		X	X	X	X		
ARP-2A											X		X	X	X	X		X	X	X	X		
ARP-3A											X		X	X	X	X		X	X	X	X		
ARP-4A											X		X	X	X	X		X	X	X	X		
ARP-5A											X		X	X	X	X		X	X	X	X		
ARP-6B											X		X	X	X	X		X	X	X	X		
ARP-7											X		X	X	X	X		X	X	X	X		
ART-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
ART-1A					X					X					X						X		Buddy well to ART-1[5]
ART-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
ART-2A					X					X					X						X		Buddy well to ART-2[5]
ART-3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
ART-3A					X					X					X						X		Buddy well to ART-3[5]
ART-4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
ART-4A					X					X					X						X		Buddy well to ART-4[5]
ART-6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
ART-7A					X					X					X						X		Buddy well to ART-7B[5]
ART-7B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
ART-8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
ART-8A					X					X					X						X		Buddy well to ART-8[5]
ART-9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
DBMW-4																X		X	X	X	X		
H-11																		X	X	X	X		
H-28A						X		X		X						X		X	X	X	X		RCRA well; 2Q and 3Q only[6]
H-48																X		X	X	X	X		
H-58A																X		X	X	X	X		

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY

Nevada Environmental Response Trust Site

Henderson, Nevada

Well ID	Monitoring Analyses																					Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
HM-2																X		X	X	X	X	
HMW-13																		X	X	X	X	
HMW-14																		X	X	X	X	
HMW-15																		X	X	X	X	
HMW-16																		X	X	X	X	
I-AA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-AB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-AC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-AD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-AR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-F	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-G	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-I	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-J	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-K	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-L	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-Q	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY

Nevada Environmental Response Trust Site
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Well ID	Monitoring Analyses: Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						Notes
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
I-T	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-U	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-W	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
I-Z	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
M-2A																X		X	X	X	X	
M-5A						X		X		X						X		X	X	X	X	RCRA well; 2Q and 3Q only[6]
M-6A						X		X		X						X		X	X	X	X	RCRA well; 2Q and 3Q only[6]
M-7B						X		X		X						X		X	X	X	X	RCRA well; 2Q and 3Q only[6]
M-10						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	NPDES Permit well[7]
M-11						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	UIC Permit well
M-12A						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	UIC Permit well
M-13																X		X	X	X	X	
M-14A										X	X		X	X	X	X		X	X	X	X	
M-19										X	X		X	X	X	X		X	X	X	X	
M-21																X		X	X	X	X	[4]
M-22A										X	X		X	X	X	X		X	X	X	X	
M-23											X		X	X	X	X		X	X	X	X	
M-25										X	X		X	X	X	X		X	X	X	X	UIC Permit well
M-31A											X		X	X	X	X		X	X	X	X	
M-32																X		X	X	X	X	
M-33																X		X	X	X	X	
M-35											X		X	X	X	X		X	X	X	X	
M-36										X	X		X	X	X	X		X	X	X	X	
M-37						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	UIC Permit well
M-38						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	Substitute for M-36 in UIC Permit

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
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Well ID	Monitoring Analyses																					Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
M-44						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	UIC Permit well
M-48A											X		X	X	X	X		X	X	X	X	
M-52											X		X	X	X	X		X	X	X	X	
M-55										X					X						X	
M-56										X					X						X	
M-57A											X		X	X	X	X		X	X	X	X	
M-58										X					X						X	
M-60										X					X						X	
M-64					X					X	X		X	X	X	X		X	X	X	X	
M-65					X					X	X		X	X	X	X		X	X	X	X	
M-66					X					X	X		X	X	X	X		X	X	X	X	
M-67					X					X	X		X	X	X	X		X	X	X	X	
M-68					X					X	X		X	X	X	X		X	X	X	X	
M-69					X					X	X		X	X	X	X		X	X	X	X	
M-70					X					X	X		X	X	X	X		X	X	X	X	
M-71					X					X	X		X	X	X	X		X	X	X	X	
M-72					X					X	X		X	X	X	X		X	X	X	X	
M-73					X					X	X		X	X	X	X		X	X	X	X	
M-74					X					X	X		X	X	X	X		X	X	X	X	
M-75																X		X	X	X	X	
M-76																X		X	X	X	X	
M-77																X		X	X	X	X	
M-78										X					X						X	
M-79										X	X		X	X	X	X		X	X	X	X	
M-80						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	Substitute for M-84 in UIC Permit
M-81A										X	X		X	X	X	X		X	X	X	X	
M-83										X	X		X	X	X	X		X	X	X	X	
M-92																X		X	X	X	X	

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
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Henderson, Nevada

Well ID	Monitoring Analyses																					Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO$_4$, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO$_4$, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO$_4$, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO$_4$, TDS	Chlorate, Nitrate	VOCs	Water Level	
M-93																X		X	X	X	X	
M-95						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	UIC Permit well
M-96										X	X		X	X	X	X		X	X	X	X	UIC Permit well[4]
M-97																X		X	X	X	X	
M-98										X	X		X	X	X	X		X	X	X	X	UIC Permit well[4]
M-99										X	X		X	X	X	X		X	X	X	X	UIC Permit well[4]
M-100						X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	UIC Permit well[4]
M-101										X	X		X	X	X	X		X	X	X	X	UIC Permit well[4]
M-103																X		X	X	X	X	[4]
M-115																X		X	X	X	X	
M-117																X		X	X	X	X	
M-118																X		X	X	X	X	
M-120																X		X	X	X	X	
M-121																X		X	X	X	X	
M-123																X		X	X	X	X	
M-124																X		X	X	X	X	
M-125																X		X	X	X	X	
M-126																X		X	X	X	X	
M-129										X					X	X		X	X	X	X	
M-132																X		X	X	X	X	
M-133																X		X	X	X	X	
M-134																X		X	X	X	X	
M-135											X		X	X	X	X		X	X	X	X	
M-136																X		X	X	X	X	
M-137																X		X	X	X	X	
M-138																X		X	X	X	X	
M-139																X		X	X	X	X	
M-140																X		X	X	X		[8]

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
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Henderson, Nevada

Well ID	Monitoring Analyses: Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						Notes
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
M-141																X		X	X	X	X	
M-142																X		X	X	X	X	
M-144																X		X	X	X	X	
M-145																X		X	X	X	X	
M-147																X		X	X	X	X	
M-148A																X		X	X	X	X	
M-149																X		X	X	X	X	
M-150																X		X	X	X	X	
M-151																X		X	X	X	X	
M-152																X		X	X	X	X	
M-153																X		X	X	X	X	
M-154																X		X	X	X	X	
M-155																X		X	X	X	X	
M-156																X		X	X	X	X	
M-161																X		X	X	X	X	
M-161D											X		X	X	X	X		X	X	X	X	
M-162																X		X	X	X	X	
M-162D											X		X	X	X	X		X	X	X	X	
M-163																X		X	X	X	X	
M-164																X		X	X	X	X	
M-165																X		X	X	X	X	
M-166										X					X						X	
M-167					X					X					X						X	
M-168										X					X						X	
M-169										X					X						X	
M-170					X					X					X						X	
M-172					X					X					X						X	
M-173					X					X					X						X	

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
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Well ID	Monitoring Analyses																						Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)							
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
M-174										X					X						X	
M-175					X					X					X						X	
M-176										X					X						X	
M-177					X					X					X						X	
M-181																X		X	X	X	X	
M-182																X		X	X	X	X	
M-186																X		X	X	X	X	
M-186D											X		X	X	X	X		X	X	X	X	
M-189											X		X	X	X	X		X	X	X	X	
M-190											X		X	X	X	X		X	X	X	X	
M-191											X		X	X	X	X		X	X	X	X	
M-192											X		X	X	X	X		X	X	X	X	
M-193											X		X	X	X	X		X	X	X	X	
MC-3																		X	X	X	X	
MC-6																		X	X	X	X	
MC-7																		X	X	X	X	
MC-50																		X	X	X	X	
MC-51																		X	X	X	X	
MC-53																X		X	X	X	X	
MC-65																X		X	X	X	X	
MC-69																		X	X	X	X	
MC-93																		X	X	X	X	
MC-97																		X	X	X	X	
MW-16																X		X	X	X	X	
MW-K4											X		X	X	X	X		X	X	X	X	
MW-K5										X	X		X	X	X	X		X	X	X	X	
PC-1																X		X	X	X	X	[4]
PC-2																X		X	X	X	X	

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
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Well ID	Monitoring Analyses																					Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
PC-4																X		X	X	X	X	
PC-18					X					X	X		X	X	X	X		X	X	X	X	
PC-21A																X		X	X	X	X	
PC-24																X		X	X	X	X	
PC-28																X		X	X	X	X	
PC-31																X		X	X	X	X	
PC-37											X		X	X	X	X		X	X	X	X	
PC-40																X		X	X	X	X	
PC-50																X		X	X	X	X	
PC-53										X	X		X	X	X	X		X	X	X	X	
PC-54											X		X	X	X	X		X	X	X	X	
PC-55					X					X	X		X	X	X	X		X	X	X	X	
PC-56										X	X		X	X	X	X		X	X	X	X	
PC-58										X	X		X	X	X	X		X	X	X	X	
PC-59										X	X		X	X	X	X		X	X	X	X	
PC-60										X	X		X	X	X	X		X	X	X	X	
PC-62										X	X		X	X	X	X		X	X	X	X	
PC-64																X		X	X	X	X	
PC-65																X		X	X	X	X	
PC-66																X		X	X	X	X	
PC-67																X		X	X	X	X	
PC-71											X		X	X	X	X		X	X	X	X	
PC-72											X		X	X	X	X		X	X	X	X	
PC-73											X		X	X	X	X		X	X	X	X	
PC-74																		X	X	X	X	
PC-76																					X	
PC-77																		X	X	X	X	
PC-78																					X	

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
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Well ID	Monitoring Analyses																					Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
PC-79																X		X	X	X	X	
PC-80																					X	
PC-81																					X	
PC-82																		X	X	X	X	
PC-83																					X	
PC-86					X					X	X		X	X	X	X		X	X	X	X	
PC-87																					X	
PC-88																					X	
PC-90					X					X	X		X	X	X	X		X	X	X	X	
PC-91					X					X	X		X	X	X	X		X	X	X	X	
PC-94											X		X	X	X	X		X	X	X	X	
PC-96																		X	X	X	X	
PC-97					X					X	X		X	X	X	X		X	X	X	X	
PC-98R										X	X		X	X	X	X		X	X	X	X	
PC-99R2/R3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-101R											X		X	X	X	X		X	X	X	X	
PC-103										X	X		X	X	X	X		X	X	X	X	
PC-107																		X	X	X	X	
PC-108																		X	X	X	X	
PC-110																		X	X	X	X	
PC-115R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-116R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-117	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-118	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-119	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-120	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-121	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-122					X					X	X		X	X	X	X		X	X	X	X	

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Well ID	Monitoring Analyses																					Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
PC-123											X		X	X	X	X		X	X	X	X	
PC-124											X		X	X	X	X		X	X	X	X	
PC-125											X		X	X	X	X		X	X	X	X	
PC-126											X		X	X	X	X		X	X	X	X	
PC-127											X		X	X	X	X		X	X	X	X	
PC-128											X		X	X	X	X		X	X	X	X	
PC-129											X		X	X	X	X		X	X	X	X	
PC-130											X		X	X	X	X		X	X	X	X	
PC-131											X		X	X	X	X		X	X	X	X	
PC-132											X		X	X	X	X		X	X	X	X	
PC-133	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-134A																X		X	X	X	X	
PC-134D											X		X	X	X	X		X	X	X	X	
PC-135A											X		X	X	X	X		X	X	X	X	
PC-136											X		X	X	X	X		X	X	X	X	
PC-137																X		X	X	X	X	
PC-137D											X		X	X	X	X		X	X	X	X	
PC-142																X		X	X	X	X	
PC-143																X		X	X	X	X	
PC-144											X		X	X	X	X		X	X	X	X	
PC-145																X		X	X	X	X	
PC-146																X		X	X	X	X	[4]
PC-147																X		X	X	X	X	[4]
PC-148											X		X	X	X	X		X	X	X	X	
PC-149											X		X	X	X	X		X	X	X	X	
PC-150	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
PC-151											X		X	X	X	X		X	X	X	X	
PC-152											X		X	X	X	X		X	X	X	X	

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Well ID	Monitoring Analyses																					Notes
	Monthly					Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level	
PC-153											X		X	X	X	X		X	X	X	X	
PC-154											X		X	X	X	X		X	X	X	X	
PC-155A											X		X	X	X	X		X	X	X	X	
PC-155B											X		X	X	X	X		X	X	X	X	
PC-156A											X		X	X	X	X		X	X	X	X	
PC-156B											X		X	X	X	X		X	X	X	X	
PC-157A											X		X	X	X	X		X	X	X	X	
PC-157B											X		X	X	X	X		X	X	X	X	
PC-158											X		X	X	X	X		X	X	X	X	
PC-159											X		X	X	X	X		X	X	X	X	
PC-160											X		X	X	X	X		X	X	X	X	
TR-1																X		X	X	X	X	
TR-2																X		X	X	X	X	
TR-3																X		X	X	X	X	
TR-4																X		X	X	X	X	
TR-5																X		X	X	X	X	
TR-6																X		X	X	X	X	
TR-7																X		X	X	X	X	
TR-8																X		X	X	X	X	
TR-9																X		X	X	X	X	
TR-10																X		X	X	X	X	
TR-11																X		X	X	X	X	
TR-12																X		X	X	X	X	
Totals	**48**	**48**	**48**	**48**	**78**	**61**	**57**	**61**	**48**	**123**	**156**	**57**	**156**	**156**	**179**	**253**	**57**	**274**	**274**	**226**	**302**	

Notes:

ft amsl = feet above mean sea level

ft bgs = feet below ground surface

TABLE 1: GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Monitoring Analyses																				Notes
	Monthly				Quarterly[1] (1Q & 3Q)					Semi-Annually[2] (4Q)					Annually[3] (2Q)						
	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	Water Level	Total Chromium	Hexavalent Chromium	ClO_4, TDS	Chlorate, Nitrate	VOCs	Water Level

NPDES = National Pollutant Discharge Elimination System

ClO_4 = Perchlorate

RCRA = Resource Conservation and Recovery Act

TDS = Total Dissolved Solids

UIC = Underground Injection Control

VOCs = Volatile Organic Compounds

[1]The quarterly sampling events generally take place in the middle of the first and third quarters, replacing the monthly events in February and August.

[2]The semi-annual sampling event generally takes place in the middle of the fourth quarter, replacing the monthly event in November.

[3]The annual sampling event generally takes place in the middle of the second quarter, replacing the monthly event in May.

[4]Recent monitoring events indicate this well is dry (i.e. groundwater elevation is below the bottom of the well screen elevation). The well will continue to be monitored as part of the Groundwater Monitoring Program, but samples will only be collected if the water level is determined to be above the bottom of the well screen.

[5]Analytical sampling will be performed at the active extraction well in a set of buddy wells. Water level measurements are taken at all wells in a set of buddy wells.

[6]Well sampled under RCRA requiring the following additional analyses:

Chloride	Specific Conductance
Phenols	Total Manganese
Total Iron	Total Organic Carbon
Sulfate	Total Organic Halides (4 Replicates)
Total Boron	Total Sodium

[7]Well sampled under NPDES Permit requiring the following additional analyses:

Total Boron	Ammonia as Nitrogen
Total Iron	Nitrate as Nitrogen
Total Arsenic	Nitrite as Nitrogen
Total Selenium	Total Inorganic Nitrogen
Chloride	Total Manganese

[8]Water level cannot be measured due to obstruction caused by a permanently installed pump. Analytical measurements are not impacted by the obstruction and will continue to be collected.

TABLE 2: MONTHLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
ART-1	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-1A	GWETS Operator	X							Buddy well to ART-1. See Note 1.
ART-2	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-2A	GWETS Operator	X							Buddy well to ART-2. See Note 1.
ART-3	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-3A	GWETS Operator	X							Buddy well to ART-3. See Note 1.
ART-4	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-4A	GWETS Operator	X							Buddy well to ART-4. See Note 1.
ART-6	GWETS Operator	X	1	1	1	1	1	1	
ART-7A	GWETS Operator	X							Buddy well to ART-7B. See Note 1.
ART-7B	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-8	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-8A	GWETS Operator	X							Buddy well to ART-8. See Note 1.
ART-9	GWETS Operator	X	1	1	1	1	1	1	
I-AA	GWETS Operator	X	1	1	1	1	1	1	
I-AB	GWETS Operator	X	1	1	1	1	1	1	
I-AC	GWETS Operator	X	1	1	1	1	1	1	
I-AD	GWETS Operator	X	1	1	1	1	1	1	
I-AR	GWETS Operator	X	1	1	1	1	1	1	
I-B	GWETS Operator	X	1	1	1	1	1	1	
I-C	GWETS Operator	X	1	1	1	1	1	1	
I-D	GWETS Operator	X	1	1	1	1	1	1	
I-E	GWETS Operator	X	1	1	1	1	1	1	
I-F	GWETS Operator	X	1	1	1	1	1	1	
I-G	GWETS Operator	X	1	1	1	1	1	1	
I-H	GWETS Operator	X	1	1	1	1	1	1	
I-I	GWETS Operator	X	1	1	1	1	1	1	

TABLE 2: MONTHLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
I-J	GWETS Operator	X	1	1	1	1	1	1	
I-K	GWETS Operator	X	1	1	1	1	1	1	
I-L	GWETS Operator	X	1	1	1	1	1	1	
I-M	GWETS Operator	X	1	1	1	1	1	1	
I-N	GWETS Operator	X	1	1	1	1	1	1	
I-O	GWETS Operator	X	1	1	1	1	1	1	
I-P	GWETS Operator	X	1	1	1	1	1	1	
I-Q	GWETS Operator	X	1	1	1	1	1	1	
I-R	GWETS Operator	X	1	1	1	1	1	1	
I-S	GWETS Operator	X	1	1	1	1	1	1	
I-T	GWETS Operator	X	1	1	1	1	1	1	
I-U	GWETS Operator	X	1	1	1	1	1	1	
I-V	GWETS Operator	X	1	1	1	1	1	1	
I-W	GWETS Operator	X	1	1	1	1	1	1	
I-X	GWETS Operator	X	1	1	1	1	1	1	
I-Y	GWETS Operator	X	1	1	1	1	1	1	
I-Z	GWETS Operator	X	1	1	1	1	1	1	
M-64	GW Contractor	X							
M-65	GW Contractor	X							
M-66	GW Contractor	X							
M-67	GW Contractor	X							
M-68	GW Contractor	X							
M-69	GW Contractor	X							
M-70	GW Contractor	X							
M-71	GW Contractor	X							
M-72	GW Contractor	X							
M-73	GW Contractor	X							

TABLE 2: MONTHLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
M-74	GW Contractor	X							
M-167	GW Contractor	X							
M-170	GW Contractor	X							
M-172	GW Contractor	X							
M-173	GW Contractor	X							
M-175	GW Contractor	X							
M-177	GW Contractor	X							
PC-18	GW Contractor	X							
PC-55	GW Contractor	X							
PC-86	GW Contractor	X							
PC-90	GW Contractor	X							
PC-91	GW Contractor	X							
PC-97	GW Contractor	X							
PC-99R2/R3	GWETS Operator	X	1	1	1	1	1	1	
PC-115R	GWETS Operator	X	1	1	1	1	1	1	
PC-116R	GWETS Operator	X	1	1	1	1	1	1	
PC-117	GWETS Operator	X	1	1	1	1	1	1	
PC-118	GWETS Operator	X	1	1	1	1	1	1	
PC-119	GWETS Operator	X	1	1	1	1	1	1	
PC-120	GWETS Operator	X	1	1	1	1	1	1	
PC-121	GWETS Operator	X	1	1	1	1	1	1	
PC-122	GW Contractor	X							
PC-133	GWETS Operator	X	1	1	1	1	1	1	
PC-150	GWETS Operator	X	1	1	1	1	1	1	
EB-1	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 2.
EB-2	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 2.
EB-3	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 2.

TABLE 2: MONTHLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	**Party Responsible for Sampling**	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	**Comments**
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
FB-1	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 2.
FB-2	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 2.
FB-3	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 2.
FD-1	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 2.
FD-2	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 2.
FD-3	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 2.
Total Samples		78	57	57	57	57	57	57	

Notes:
DTW = depth to water
GW Contractor = groundwater sampling contractor
GWETS Operator = groundwater extraction and treatment system operator
NA = not applicable
TDS = total dissolved solids

1. Analytical samples will be collected at whichever extraction well within a pair of buddy wells is actively pumping at the time of sampling. DTW will be measured at both wells within a pair of buddy wells.
2. Quality Assurance/Quality Control (QA/QC) samples (equipment blanks, field blanks, and field duplicates) should be collected at wells where primary samples are analyzed for the same suite of analytes required for the QA/QC sample.

TABLE 3: QUARTERLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
ART-1	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-1A	GWETS Operator	X							Buddy well to ART-1. See Note 1.
ART-2	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-2A	GWETS Operator	X							Buddy well to ART-2. See Note 1.
ART-3	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-3A	GWETS Operator	X							Buddy well to ART-3. See Note 1.
ART-4	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-4A	GWETS Operator	X							Buddy well to ART-4. See Note 1.
ART-6	GWETS Operator	X	1	1	1	1	1	1	
ART-7A	GWETS Operator	X							Buddy well to ART-7B. See Note 1.
ART-7B	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-8	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-8A	GWETS Operator	X							Buddy well to ART-8. See Note 1.
ART-9	GWETS Operator	X	1	1	1	1	1	1	
H-28A	GW Contractor	X		1			1	1	RCRA well; 2Q and 3Q only. See Note 2.
I-AA	GWETS Operator	X	1	1	1	1	1	1	
I-AB	GWETS Operator	X	1	1	1	1	1	1	
I-AC	GWETS Operator	X	1	1	1	1	1	1	
I-AD	GWETS Operator	X	1	1	1	1	1	1	
I-AR	GWETS Operator	X	1	1	1	1	1	1	
I-B	GWETS Operator	X	1	1	1	1	1	1	
I-C	GWETS Operator	X	1	1	1	1	1	1	
I-D	GWETS Operator	X	1	1	1	1	1	1	
I-E	GWETS Operator	X	1	1	1	1	1	1	
I-F	GWETS Operator	X	1	1	1	1	1	1	
I-G	GWETS Operator	X	1	1	1	1	1	1	
I-H	GWETS Operator	X	1	1	1	1	1	1	

TABLE 3: QUARTERLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW NA	Chlorate EPA 300.1 (no field filtration)	Chromium EPA 200.7 (no field filtration)	Chromium, Hexavalent EPA 218.6 (no field filtration)	Nitrate as N EPA 300.0 (no field filtration)	Perchlorate EPA 314.0 (no field filtration)	TDS SM 2540C (no field filtration)	Comments
I-I	GWETS Operator	X	1	1	1	1	1	1	
I-J	GWETS Operator	X	1	1	1	1	1	1	
I-K	GWETS Operator	X	1	1	1	1	1	1	
I-L	GWETS Operator	X	1	1	1	1	1	1	
I-M	GWETS Operator	X	1	1	1	1	1	1	
I-N	GWETS Operator	X	1	1	1	1	1	1	
I-O	GWETS Operator	X	1	1	1	1	1	1	
I-P	GWETS Operator	X	1	1	1	1	1	1	
I-Q	GWETS Operator	X	1	1	1	1	1	1	
I-R	GWETS Operator	X	1	1	1	1	1	1	
I-S	GWETS Operator	X	1	1	1	1	1	1	
I-T	GWETS Operator	X	1	1	1	1	1	1	
I-U	GWETS Operator	X	1	1	1	1	1	1	
I-V	GWETS Operator	X	1	1	1	1	1	1	
I-W	GWETS Operator	X	1	1	1	1	1	1	
I-X	GWETS Operator	X	1	1	1	1	1	1	
I-Y	GWETS Operator	X	1	1	1	1	1	1	
I-Z	GWETS Operator	X	1	1	1	1	1	1	
M-5A	GW Contractor	X		1			1	1	RCRA well; 2Q and 3Q only. See Note 2.
M-6A	GW Contractor	X		1			1	1	RCRA well; 2Q and 3Q only. See Note 2.
M-7B	GW Contractor	X		1			1	1	RCRA well; 2Q and 3Q only. See Note 2.
M-10	GW Contractor	X		1	1		1	1	NPDES Permit well. See Note 3.
M-11	GW Contractor	X		1	1		1	1	UIC Permit well.
M-12A	GW Contractor	X		1	1		1	1	UIC Permit well.
M-14A	GW Contractor	X							
M-19	GW Contractor	X							
M-22A	GW Contractor	X							

TABLE 3: QUARTERLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
M-25	GW Contractor	X							UIC Permit well.
M-36	GW Contractor	X							
M-37	GW Contractor	X		1	1		1	1	UIC Permit well.
M-38	GW Contractor	X		1	1		1	1	Substitute for M-36 in UIC Permit.
M-44	GW Contractor	X		1	1		1	1	UIC Permit well.
M-55	GW Contractor	X							
M-56	GW Contractor	X							
M-58	GW Contractor	X							
M-60	GW Contractor	X							
M-64	GW Contractor	X							
M-65	GW Contractor	X							
M-66	GW Contractor	X							
M-67	GW Contractor	X							
M-68	GW Contractor	X							
M-69	GW Contractor	X							
M-70	GW Contractor	X							
M-71	GW Contractor	X							
M-72	GW Contractor	X							
M-73	GW Contractor	X							
M-74	GW Contractor	X							
M-78	GW Contractor	X							
M-79	GW Contractor	X							
M-80	GW Contractor	X		1	1		1	1	Substitute for M-84 in UIC Permit.
M-81A	GW Contractor	X							
M-83	GW Contractor	X							
M-95	GW Contractor	X		1	1		1	1	UIC Permit well.
M-96	GW Contractor	X							UIC Permit well. See Note 4.

TABLE 3: QUARTERLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
M-98	GW Contractor	X							UIC Permit well. See Note 4.
M-99	GW Contractor	X							UIC Permit well. See Note 4.
M-100	GW Contractor	X		1	1		1	1	UIC Permit well. See Note 4.
M-101	GW Contractor	X							UIC Permit well. See Note 4.
M-129	GW Contractor	X							
M-166	GW Contractor	X							
M-167	GW Contractor	X							
M-168	GW Contractor	X							
M-169	GW Contractor	X							
M-170	GW Contractor	X							
M-172	GW Contractor	X							
M-173	GW Contractor	X							
M-174	GW Contractor	X							
M-175	GW Contractor	X							
M-176	GW Contractor	X							
M-177	GW Contractor	X							
MW-K5	GW Contractor	X							
PC-18	GW Contractor	X							
PC-53	GW Contractor	X							
PC-55	GW Contractor	X							
PC-56	GW Contractor	X							
PC-58	GW Contractor	X							
PC-59	GW Contractor	X							
PC-60	GW Contractor	X							
PC-62	GW Contractor	X							
PC-86	GW Contractor	X							
PC-90	GW Contractor	X							

TABLE 3: QUARTERLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
PC-91	GW Contractor	X							
PC-97	GW Contractor	X							
PC-98R	GW Contractor	X							
PC-99R2/R3	GWETS Operator	X	1	1	1	1	1	1	
PC-103	GW Contractor	X							
PC-115R	GWETS Operator	X	1	1	1	1	1	1	
PC-116R	GWETS Operator	X	1	1	1	1	1	1	
PC-117	GWETS Operator	X	1	1	1	1	1	1	
PC-118	GWETS Operator	X	1	1	1	1	1	1	
PC-119	GWETS Operator	X	1	1	1	1	1	1	
PC-120	GWETS Operator	X	1	1	1	1	1	1	
PC-121	GWETS Operator	X	1	1	1	1	1	1	
PC-122	GW Contractor	X							
PC-133	GWETS Operator	X	1	1	1	1	1	1	
PC-150	GWETS Operator	X	1	1	1	1	1	1	
EB-1	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 5.
EB-2	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 5.
EB-3	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 5.
EB-4	GW Contractor			1	1		1	1	Equipment Blank. See Note 5.
FB-1	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 5.
FB-2	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 5.
FB-3	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 5.
FB-4	GW Contractor			1	1		1	1	Field Blank. See Note 5.
FD-1	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 5.
FD-2	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 5.

TABLE 3: QUARTERLY GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
FD-3	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 5.
FD-4	GW Contractor			1	1		1	1	Field Duplicate. See Note 5.
Total Samples		123	57	73	69	57	73	73	

Notes:
DTW = depth to water
GW Contractor = groundwater sampling contractor
GWETS Operator = groundwater extraction and treatment system operator
NPDES = National Pollutant Discharge Elimination System
NA = not applicable
RCRA = Resource Conservation and Recovery Act
TDS = total dissolved solids
UIC = Underground Injection Control

1. Analytical samples will be collected at whichever extraction well within a pair of buddy wells is actively pumping at the time of sampling. DTW will be measured at both wells within a pair of buddy wells.
2. The 4 RCRA wells (H-28A, M-5A, M-6A, M-7B) are sampled as part of the groundwater monitoring program only in second quarter (annual event) and third quarter (quarterly event). They are not sampled in first quarter (quarterly event). Additional analyses required by RCRA are total boron, chloride, total iron, total manganese, phenols, total sodium, specific conductance, sulfate, total organic carbon, and total organic halides (4 replicates).
3. Well M-10 is sampled for additional analytes per the NPDES permit (ammonia as nitrogen, total arsenic, total boron, chloride, total iron, total manganese, nitrate as nitrogen, nitrite as nitrogen, total inorganic nitrogen, total selenium).
4. Recent monitoring events indicate this well is dry (i.e. groundwater elevation is below the bottom of the well screen elevation). The well will continue to be monitored as part of the Groundwater Monitoring Program, but samples will only be collected if the water level is determined to be above the bottom of the well screen.
5. Quality Assurance/Quality Control (QA/QC) samples (equipment blanks, field blanks, and field duplicates) should be collected at wells where primary samples are analyzed for the same suite of analytes required for the QA/QC sample.

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
ARP-1	GW Contractor	X	1	1		1	1	1	
ARP-2A	GW Contractor	X	1	1		1	1	1	
ARP-3A	GW Contractor	X	1	1		1	1	1	
ARP-4A	GW Contractor	X	1	1		1	1	1	
ARP-5A	GW Contractor	X	1	1		1	1	1	
ARP-6B	GW Contractor	X	1	1		1	1	1	
ARP-7	GW Contractor	X	1	1		1	1	1	
ART-1	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-1A	GWETS Operator	X							Buddy well to ART-1. See Note 1.
ART-2	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-2A	GWETS Operator	X							Buddy well to ART-2. See Note 1.
ART-3	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-3A	GWETS Operator	X							Buddy well to ART-3. See Note 1.
ART-4	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-4A	GWETS Operator	X							Buddy well to ART-4. See Note 1.
ART-6	GWETS Operator	X	1	1	1	1	1	1	
ART-7A	GWETS Operator	X							Buddy well to ART-7B. See Note 1.
ART-7B	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-8	GWETS Operator	X	1	1	1	1	1	1	See Note 1.
ART-8A	GWETS Operator	X							Buddy well to ART-8. See Note 1.
ART-9	GWETS Operator	X	1	1	1	1	1	1	
I-AA	GWETS Operator	X	1	1	1	1	1	1	
I-AB	GWETS Operator	X	1	1	1	1	1	1	
I-AC	GWETS Operator	X	1	1	1	1	1	1	
I-AD	GWETS Operator	X	1	1	1	1	1	1	
I-AR	GWETS Operator	X	1	1	1	1	1	1	
I-B	GWETS Operator	X	1	1	1	1	1	1	

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
I-C	GWETS Operator	X	1	1	1	1	1	1	
I-D	GWETS Operator	X	1	1	1	1	1	1	
I-E	GWETS Operator	X	1	1	1	1	1	1	
I-F	GWETS Operator	X	1	1	1	1	1	1	
I-G	GWETS Operator	X	1	1	1	1	1	1	
I-H	GWETS Operator	X	1	1	1	1	1	1	
I-I	GWETS Operator	X	1	1	1	1	1	1	
I-J	GWETS Operator	X	1	1	1	1	1	1	
I-K	GWETS Operator	X	1	1	1	1	1	1	
I-L	GWETS Operator	X	1	1	1	1	1	1	
I-M	GWETS Operator	X	1	1	1	1	1	1	
I-N	GWETS Operator	X	1	1	1	1	1	1	
I-O	GWETS Operator	X	1	1	1	1	1	1	
I-P	GWETS Operator	X	1	1	1	1	1	1	
I-Q	GWETS Operator	X	1	1	1	1	1	1	
I-R	GWETS Operator	X	1	1	1	1	1	1	
I-S	GWETS Operator	X	1	1	1	1	1	1	
I-T	GWETS Operator	X	1	1	1	1	1	1	
I-U	GWETS Operator	X	1	1	1	1	1	1	
I-V	GWETS Operator	X	1	1	1	1	1	1	
I-W	GWETS Operator	X	1	1	1	1	1	1	
I-X	GWETS Operator	X	1	1	1	1	1	1	
I-Y	GWETS Operator	X	1	1	1	1	1	1	
I-Z	GWETS Operator	X	1	1	1	1	1	1	
M-10	GW Contractor	X	1	1	1	1	1	1	NPDES Permit well. See Note 2.
M-11	GW Contractor	X	1	1	1	1	1	1	UIC Permit well.
M-12A	GW Contractor	X	1	1	1	1	1	1	UIC Permit well.

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
M-14A	GW Contractor	X	1	1		1	1	1	
M-19	GW Contractor	X	1	1		1	1	1	
M-22A	GW Contractor	X	1	1		1	1	1	
M-23	GW Contractor	X	1	1		1	1	1	
M-25	GW Contractor	X	1	1		1	1	1	UIC Permit well.
M-31A	GW Contractor	X	1	1		1	1	1	
M-35	GW Contractor	X	1	1		1	1	1	
M-36	GW Contractor	X	1	1		1	1	1	
M-37	GW Contractor	X	1	1	1	1	1	1	UIC Permit well.
M-38	GW Contractor	X	1	1	1	1	1	1	Substitute for M-36 in UIC Permit.
M-44	GW Contractor	X	1	1	1	1	1	1	UIC Permit well.
M-48A	GW Contractor	X	1	1		1	1	1	
M-52	GW Contractor	X	1	1		1	1	1	
M-55	GW Contractor	X							
M-56	GW Contractor	X							
M-57A	GW Contractor	X	1	1		1	1	1	
M-58	GW Contractor	X							
M-60	GW Contractor	X							
M-64	GW Contractor	X	1	1		1	1	1	
M-65	GW Contractor	X	1	1		1	1	1	
M-66	GW Contractor	X	1	1		1	1	1	
M-67	GW Contractor	X	1	1		1	1	1	
M-68	GW Contractor	X	1	1		1	1	1	
M-69	GW Contractor	X	1	1		1	1	1	
M-70	GW Contractor	X	1	1		1	1	1	
M-71	GW Contractor	X	1	1		1	1	1	
M-72	GW Contractor	X	1	1		1	1	1	

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
M-73	GW Contractor	X	1	1		1	1	1	
M-74	GW Contractor	X	1	1		1	1	1	
M-78	GW Contractor	X							
M-79	GW Contractor	X	1	1		1	1	1	
M-80	GW Contractor	X	1	1	1	1	1	1	Substitute for M-84 in UIC Permit.
M-81A	GW Contractor	X	1	1		1	1	1	
M-83	GW Contractor	X	1	1		1	1	1	
M-95	GW Contractor	X	1	1	1	1	1	1	UIC Permit well.
M-96	GW Contractor	X	1	1		1	1	1	UIC Permit well. See Note 3.
M-98	GW Contractor	X	1	1		1	1	1	UIC Permit well. See Note 3.
M-99	GW Contractor	X	1	1		1	1	1	UIC Permit well. See Note 3.
M-100	GW Contractor	X	1	1	1	1	1	1	UIC Permit well. See Note 3.
M-101	GW Contractor	X	1	1		1	1	1	UIC Permit well. See Note 3.
M-129	GW Contractor	X							
M-135	GW Contractor	X	1	1		1	1	1	
M-161D	GW Contractor	X	1	1		1	1	1	
M-162D	GW Contractor	X	1	1		1	1	1	
M-166	GW Contractor	X							
M-167	GW Contractor	X							
M-168	GW Contractor	X							
M-169	GW Contractor	X							
M-170	GW Contractor	X							
M-172	GW Contractor	X							
M-173	GW Contractor	X							
M-174	GW Contractor	X							
M-175	GW Contractor	X							
M-176	GW Contractor	X							

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
M-177	GW Contractor	X							
M-186D	GW Contractor	X	1	1		1	1	1	
M-189	GW Contractor	X	1	1		1	1	1	
M-190	GW Contractor	X	1	1		1	1	1	
M-191	GW Contractor	X	1	1		1	1	1	
M-192	GW Contractor	X	1	1		1	1	1	
M-193	GW Contractor	X	1	1		1	1	1	
MW-K4	GW Contractor	X	1	1		1	1	1	
MW-K5	GW Contractor	X	1	1		1	1	1	
PC-18	GW Contractor	X	1	1		1	1	1	
PC-37	GW Contractor	X	1	1		1	1	1	
PC-53	GW Contractor	X	1	1		1	1	1	
PC-54	GW Contractor	X	1	1		1	1	1	
PC-55	GW Contractor	X	1	1		1	1	1	
PC-56	GW Contractor	X	1	1		1	1	1	
PC-58	GW Contractor	X	1	1		1	1	1	
PC-59	GW Contractor	X	1	1		1	1	1	
PC-60	GW Contractor	X	1	1		1	1	1	
PC-62	GW Contractor	X	1	1		1	1	1	
PC-71	GW Contractor	X	1	1		1	1	1	
PC-72	GW Contractor	X	1	1		1	1	1	
PC-73	GW Contractor	X	1	1		1	1	1	
PC-86	GW Contractor	X	1	1		1	1	1	
PC-90	GW Contractor	X	1	1		1	1	1	
PC-91	GW Contractor	X	1	1		1	1	1	
PC-94	GW Contractor	X	1	1		1	1	1	
PC-97	GW Contractor	X	1	1		1	1	1	

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
PC-98R	GW Contractor	X	1	1		1	1	1	
PC-99R2/R3	GWETS Operator	X	1	1	1	1	1	1	
PC-101R	GW Contractor	X	1	1		1	1	1	
PC-103	GW Contractor	X	1	1		1	1	1	
PC-115R	GWETS Operator	X	1	1	1	1	1	1	
PC-116R	GWETS Operator	X	1	1	1	1	1	1	
PC-117	GWETS Operator	X	1	1	1	1	1	1	
PC-118	GWETS Operator	X	1	1	1	1	1	1	
PC-119	GWETS Operator	X	1	1	1	1	1	1	
PC-120	GWETS Operator	X	1	1	1	1	1	1	
PC-121	GWETS Operator	X	1	1	1	1	1	1	
PC-122	GW Contractor	X	1	1		1	1	1	
PC-123	GW Contractor	X	1	1		1	1	1	
PC-124	GW Contractor	X	1	1		1	1	1	
PC-125	GW Contractor	X	1	1		1	1	1	
PC-126	GW Contractor	X	1	1		1	1	1	
PC-127	GW Contractor	X	1	1		1	1	1	
PC-128	GW Contractor	X	1	1		1	1	1	
PC-129	GW Contractor	X	1	1		1	1	1	
PC-130	GW Contractor	X	1	1		1	1	1	
PC-131	GW Contractor	X	1	1		1	1	1	
PC-132	GW Contractor	X	1	1		1	1	1	
PC-133	GWETS Operator	X	1	1	1	1	1	1	
PC-134D	GW Contractor	X	1	1		1	1	1	
PC-135A	GW Contractor	X	1	1		1	1	1	
PC-136	GW Contractor	X	1	1		1	1	1	
PC-137D	GW Contractor	X	1	1		1	1	1	

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
PC-144	GW Contractor	X	1	1		1	1	1	
PC-148	GW Contractor	X	1	1		1	1	1	
PC-149	GW Contractor	X	1	1		1	1	1	
PC-150	GWETS Operator	X	1	1	1	1	1	1	
PC-151	GW Contractor	X	1	1		1	1	1	
PC-152	GW Contractor	X	1	1		1	1	1	
PC-153	GW Contractor	X	1	1		1	1	1	
PC-154	GW Contractor	X	1	1		1	1	1	
PC-155A	GW Contractor	X	1	1		1	1	1	
PC-155B	GW Contractor	X	1	1		1	1	1	
PC-156A	GW Contractor	X	1	1		1	1	1	
PC-156B	GW Contractor	X	1	1		1	1	1	
PC-157A	GW Contractor	X	1	1		1	1	1	
PC-157B	GW Contractor	X	1	1		1	1	1	
PC-158	GW Contractor	X	1	1		1	1	1	
PC-159	GW Contractor	X	1	1		1	1	1	
PC-160	GW Contractor	X	1	1		1	1	1	
EB-1	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 4.
EB-2	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 4.
EB-3	GWETS Operator		1	1	1	1	1	1	Equipment Blank. See Note 4.
EB-4	GW Contractor		1	1	1	1	1	1	Equipment Blank. See Note 4.
EB-5	GW Contractor		1	1		1	1	1	Equipment Blank. See Note 4.
EB-6	GW Contractor		1	1		1	1	1	Equipment Blank. See Note 4.
EB-7	GW Contractor		1	1		1	1	1	Equipment Blank. See Note 4.
EB-8	GW Contractor		1	1		1	1	1	Equipment Blank. See Note 4.
EB-9	GW Contractor		1	1		1	1	1	Equipment Blank. See Note 4.
FB-1	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 4.

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	
FB-2	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 4.
FB-3	GWETS Operator		1	1	1	1	1	1	Field Blank. See Note 4.
FB-4	GW Contractor		1	1	1	1	1	1	Field Blank. See Note 4.
FB-5	GW Contractor		1	1		1	1	1	Field Blank. See Note 4.
FB-6	GW Contractor		1	1		1	1	1	Field Blank. See Note 4.
FB-7	GW Contractor		1	1		1	1	1	Field Blank. See Note 4.
FB-8	GW Contractor		1	1		1	1	1	Field Blank. See Note 4.
FB-9	GW Contractor		1	1		1	1	1	Field Blank. See Note 4.
FD-1	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 4.
FD-2	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 4.
FD-3	GWETS Operator		1	1	1	1	1	1	Field Duplicate. See Note 4.
FD-4	GW Contractor		1	1	1	1	1	1	Field Duplicate. See Note 4.
FD-5	GW Contractor		1	1		1	1	1	Field Duplicate. See Note 4.
FD-6	GW Contractor		1	1		1	1	1	Field Duplicate. See Note 4.
FD-7	GW Contractor		1	1		1	1	1	Field Duplicate. See Note 4.
FD-8	GW Contractor		1	1		1	1	1	Field Duplicate. See Note 4.
FD-9	GW Contractor		1	1		1	1	1	Field Duplicate. See Note 4.
Total Samples		179	183	183	69	183	183	183	

TABLE 4: SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY

Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	

Notes:
DTW = depth to water
GW Contractor = groundwater sampling contractor
GWETS Operator = groundwater extraction and treatment system operator
NPDES = National Pollutant Discharge Elimination System
NA = not applicable
TDS = total dissolved solids
UIC = Underground Injection Control

1. Analytical samples will be collected at whichever extraction well within a pair of buddy wells is actively pumping at the time of sampling. DTW will be measured at both wells within a pair of buddy wells.
2. Well M-10 is sampled for additional analytes per the NPDES permit (ammonia as nitrogen, total arsenic, total boron, chloride, total iron, total manganese, nitrate as nitrogen, nitrite as nitrogen, total inorganic nitrogen, total selenium).
3. Recent monitoring events indicate this well is dry (i.e. groundwater elevation is below the bottom of the well screen elevation). The well will continue to be monitored as part of the Groundwater Monitoring Program, but samples will only be collected if the water level is determined to be above the bottom of the well screen.
4. Quality Assurance/Quality Control (QA/QC) samples (equipment blanks, field blanks, and field duplicates) should be collected at wells where primary samples are analyzed for the same suite of analytes required for the QA/QC sample.

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	**Party Responsible for Sampling**	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	**Comments**
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
AA-01	GW Contractor	X	1			1	1	1	1	
AA-11	GW Contractor	X	1	1		1	1	1	1	See Note 1.
ARP-1	GW Contractor	X	1	1		1	1	1	1	
ARP-2A	GW Contractor	X	1	1		1	1	1	1	
ARP-3A	GW Contractor	X	1	1		1	1	1	1	
ARP-4A	GW Contractor	X	1	1		1	1	1	1	
ARP-5A	GW Contractor	X	1	1		1	1	1	1	
ARP-6B	GW Contractor	X	1	1		1	1	1	1	
ARP-7	GW Contractor	X	1	1		1	1	1	1	
ART-1	GWETS Operator	X	1	1	1	1	1	1		See Note 2.
ART-1A	GWETS Operator	X								Buddy well to ART-1. See Note 2.
ART-2	GWETS Operator	X	1	1	1	1	1	1		See Note 2.
ART-2A	GWETS Operator	X								Buddy well to ART-2. See Note 2.
ART-3	GWETS Operator	X	1	1	1	1	1	1		See Note 2.
ART-3A	GWETS Operator	X								Buddy well to ART-3. See Note 2.
ART-4	GWETS Operator	X	1	1	1	1	1	1		See Note 2.
ART-4A	GWETS Operator	X								Buddy well to ART-4. See Note 2.
ART-6	GWETS Operator	X	1	1	1	1	1	1		
ART-7A	GWETS Operator	X								Buddy well to ART-7B. See Note 2.
ART-7B	GWETS Operator	X	1	1	1	1	1	1		See Note 2.
ART-8	GWETS Operator	X	1	1	1	1	1	1		See Note 2.
ART-8A	GWETS Operator	X								Buddy well to ART-8. See Note 2.
ART-9	GWETS Operator	X	1	1	1	1	1	1		
DBMW-4	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
H-11	GW Contractor	X	1			1	1	1	1	
H-28A	GW Contractor	X	1	1		1	1	1	1	RCRA well. See Note 3.
H-48	GW Contractor	X	1	1		1	1	1	1	
H-58A	GW Contractor	X	1	1		1	1	1	1	
HM-2	GW Contractor	X	1	1		1	1	1	1	
HMW-13	GW Contractor	X	1			1	1	1	1	
HMW-14	GW Contractor	X	1			1	1	1	1	
HMW-15	GW Contractor	X	1			1	1	1	1	
HMW-16	GW Contractor	X	1			1	1	1	1	
I-AA	GWETS Operator	X	1	1	1	1	1	1		
I-AB	GWETS Operator	X	1	1	1	1	1	1		
I-AC	GWETS Operator	X	1	1	1	1	1	1		
I-AD	GWETS Operator	X	1	1	1	1	1	1		
I-AR	GWETS Operator	X	1	1	1	1	1	1		
I-B	GWETS Operator	X	1	1	1	1	1	1		
I-C	GWETS Operator	X	1	1	1	1	1	1		
I-D	GWETS Operator	X	1	1	1	1	1	1		
I-E	GWETS Operator	X	1	1	1	1	1	1		
I-F	GWETS Operator	X	1	1	1	1	1	1		
I-G	GWETS Operator	X	1	1	1	1	1	1		
I-H	GWETS Operator	X	1	1	1	1	1	1		
I-I	GWETS Operator	X	1	1	1	1	1	1		
I-J	GWETS Operator	X	1	1	1	1	1	1		
I-K	GWETS Operator	X	1	1	1	1	1	1		

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
I-L	GWETS Operator	X	1	1	1	1	1	1		
I-M	GWETS Operator	X	1	1	1	1	1	1		
I-N	GWETS Operator	X	1	1	1	1	1	1		
I-O	GWETS Operator	X	1	1	1	1	1	1		
I-P	GWETS Operator	X	1	1	1	1	1	1		
I-Q	GWETS Operator	X	1	1	1	1	1	1		
I-R	GWETS Operator	X	1	1	1	1	1	1		
I-S	GWETS Operator	X	1	1	1	1	1	1		
I-T	GWETS Operator	X	1	1	1	1	1	1		
I-U	GWETS Operator	X	1	1	1	1	1	1		
I-V	GWETS Operator	X	1	1	1	1	1	1		
I-W	GWETS Operator	X	1	1	1	1	1	1		
I-X	GWETS Operator	X	1	1	1	1	1	1		
I-Y	GWETS Operator	X	1	1	1	1	1	1		
I-Z	GWETS Operator	X	1	1	1	1	1	1		
M-2A	GW Contractor	X	1	1		1	1	1	1	
M-5A	GW Contractor	X	1	1		1	1	1	1	RCRA well. See Note 3.
M-6A	GW Contractor	X	1	1		1	1	1	1	RCRA well. See Note 3.
M-7B	GW Contractor	X	1	1		1	1	1	1	RCRA well. See Note 3.
M-10	GW Contractor	X	1	1	1	1	1	1	1	NPDES Permit well. See Note 4.
M-11	GW Contractor	X	1	1	1	1	1	1	1	UIC Permit well.
M-12A	GW Contractor	X	1	1	1	1	1	1	1	UIC Permit well.
M-13	GW Contractor	X	1	1		1	1	1	1	
M-14A	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
M-19	GW Contractor	X	1	1		1	1	1	1	
M-21	GW Contractor	X	1	1		1	1	1	1	See Note 1.
M-22A	GW Contractor	X	1	1		1	1	1	1	
M-23	GW Contractor	X	1	1		1	1	1	1	
M-25	GW Contractor	X	1	1		1	1	1	1	UIC Permit well.
M-31A	GW Contractor	X	1	1		1	1	1	1	
M-32	GW Contractor	X	1	1		1	1	1	1	
M-33	GW Contractor	X	1	1		1	1	1	1	
M-35	GW Contractor	X	1	1		1	1	1	1	
M-36	GW Contractor	X	1	1		1	1	1	1	
M-37	GW Contractor	X	1	1	1	1	1	1	1	UIC Permit well.
M-38	GW Contractor	X	1	1	1	1	1	1	1	Substitute for M-36 in UIC Permit.
M-44	GW Contractor	X	1	1	1	1	1	1	1	UIC Permit well.
M-48A	GW Contractor	X	1	1		1	1	1	1	
M-52	GW Contractor	X	1	1		1	1	1	1	
M-55	GW Contractor	X								
M-56	GW Contractor	X								
M-57A	GW Contractor	X	1	1		1	1	1	1	
M-58	GW Contractor	X								
M-60	GW Contractor	X								
M-64	GW Contractor	X	1	1		1	1	1	1	
M-65	GW Contractor	X	1	1		1	1	1	1	
M-66	GW Contractor	X	1	1		1	1	1	1	
M-67	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
M-68	GW Contractor	X	1	1		1	1	1	1	
M-69	GW Contractor	X	1	1		1	1	1	1	
M-70	GW Contractor	X	1	1		1	1	1	1	
M-71	GW Contractor	X	1	1		1	1	1	1	
M-72	GW Contractor	X	1	1		1	1	1	1	
M-73	GW Contractor	X	1	1		1	1	1	1	
M-74	GW Contractor	X	1	1		1	1	1	1	
M-75	GW Contractor	X	1	1		1	1	1	1	
M-76	GW Contractor	X	1	1		1	1	1	1	
M-77	GW Contractor	X	1	1		1	1	1	1	
M-78	GW Contractor	X								
M-79	GW Contractor	X	1	1		1	1	1	1	
M-80	GW Contractor	X	1	1	1	1	1	1	1	Substitute for M-84 in UIC Permit.
M-81A	GW Contractor	X	1	1		1	1	1	1	
M-83	GW Contractor	X	1	1		1	1	1	1	
M-92	GW Contractor	X	1	1		1	1	1	1	
M-93	GW Contractor	X	1	1		1	1	1	1	
M-95	GW Contractor	X	1	1	1	1	1	1	1	UIC Permit well.
M-96	GW Contractor	X	1	1		1	1	1	1	UIC Permit well. See Note 1.
M-97	GW Contractor	X	1	1		1	1	1	1	
M-98	GW Contractor	X	1	1		1	1	1	1	UIC Permit well. See Note 1.
M-99	GW Contractor	X	1	1		1	1	1	1	UIC Permit well. See Note 1.
M-100	GW Contractor	X	1	1	1	1	1	1	1	UIC Permit well. See Note 1.
M-101	GW Contractor	X	1	1		1	1	1	1	UIC Permit well. See Note 1.

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
M-103	GW Contractor	X	1	1		1	1	1	1	See Note 1.
M-115	GW Contractor	X	1	1		1	1	1	1	
M-117	GW Contractor	X	1	1		1	1	1	1	
M-118	GW Contractor	X	1	1		1	1	1	1	
M-120	GW Contractor	X	1	1		1	1	1	1	
M-121	GW Contractor	X	1	1		1	1	1	1	
M-123	GW Contractor	X	1	1		1	1	1	1	
M-124	GW Contractor	X	1	1		1	1	1	1	
M-125	GW Contractor	X	1	1		1	1	1	1	
M-126	GW Contractor	X	1	1		1	1	1	1	
M-129	GW Contractor	X	1	1		1	1	1	1	
M-132	GW Contractor	X	1	1		1	1	1	1	
M-133	GW Contractor	X	1	1		1	1	1	1	
M-134	GW Contractor	X	1	1		1	1	1	1	
M-135	GW Contractor	X	1	1		1	1	1	1	
M-136	GW Contractor	X	1	1		1	1	1	1	
M-137	GW Contractor	X	1	1		1	1	1	1	
M-138	GW Contractor	X	1	1		1	1	1	1	
M-139	GW Contractor	X	1	1		1	1	1	1	
M-140	GW Contractor		1	1		1	1	1	1	See Note 5.
M-141	GW Contractor	X	1	1		1	1	1	1	
M-142	GW Contractor	X	1	1		1	1	1	1	
M-144	GW Contractor	X	1	1		1	1	1	1	
M-145	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW NA	Chlorate EPA 300.1 (no field filtration)	Chromium EPA 200.7 (no field filtration)	Chromium, Hexavalent EPA 218.6 (no field filtration)	Nitrate as N EPA 300.0 (no field filtration)	Perchlorate EPA 314.0 (no field filtration)	TDS SM 2540C (no field filtration)	VOCs EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	Comments
M-147	GW Contractor	X	1	1		1	1	1	1	
M-148A	GW Contractor	X	1	1		1	1	1	1	
M-149	GW Contractor	X	1	1		1	1	1	1	
M-150	GW Contractor	X	1	1		1	1	1	1	
M-151	GW Contractor	X	1	1		1	1	1	1	
M-152	GW Contractor	X	1	1		1	1	1	1	
M-153	GW Contractor	X	1	1		1	1	1	1	
M-154	GW Contractor	X	1	1		1	1	1	1	
M-155	GW Contractor	X	1	1		1	1	1	1	
M-156	GW Contractor	X	1	1		1	1	1	1	
M-161	GW Contractor	X	1	1		1	1	1	1	
M-161D	GW Contractor	X	1	1		1	1	1	1	
M-162	GW Contractor	X	1	1		1	1	1	1	
M-162D	GW Contractor	X	1	1		1	1	1	1	
M-163	GW Contractor	X	1	1		1	1	1	1	
M-164	GW Contractor	X	1	1		1	1	1	1	
M-165	GW Contractor	X	1	1		1	1	1	1	
M-166	GW Contractor	X								
M-167	GW Contractor	X								
M-168	GW Contractor	X								
M-169	GW Contractor	X								
M-170	GW Contractor	X								
M-172	GW Contractor	X								
M-173	GW Contractor	X								

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
M-174	GW Contractor	X								
M-175	GW Contractor	X								
M-176	GW Contractor	X								
M-177	GW Contractor	X								
M-181	GW Contractor	X	1	1		1	1	1	1	
M-182	GW Contractor	X	1	1		1	1	1	1	
M-186	GW Contractor	X	1	1		1	1	1	1	
M-186D	GW Contractor	X	1	1		1	1	1	1	
M-189	GW Contractor	X	1	1		1	1	1	1	
M-190	GW Contractor	X	1	1		1	1	1	1	
M-191	GW Contractor	X	1	1		1	1	1	1	
M-192	GW Contractor	X	1	1		1	1	1	1	
M-193	GW Contractor	X	1	1		1	1	1	1	
MC-3	GW Contractor	X	1			1	1	1	1	
MC-6	GW Contractor	X	1			1	1	1	1	
MC-7	GW Contractor	X	1			1	1	1	1	
MC-50	GW Contractor	X	1			1	1	1	1	
MC-51	GW Contractor	X	1			1	1	1	1	
MC-53	GW Contractor	X	1	1		1	1	1	1	
MC-65	GW Contractor	X	1	1		1	1	1	1	
MC-69	GW Contractor	X	1			1	1	1	1	
MC-93	GW Contractor	X	1			1	1	1	1	
MC-97	GW Contractor	X	1			1	1	1	1	
MW-16	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
MW-K4	GW Contractor	X	1	1		1	1	1	1	
MW-K5	GW Contractor	X	1	1		1	1	1	1	
PC-1	GW Contractor	X	1	1		1	1	1	1	See Note 1.
PC-2	GW Contractor	X	1	1		1	1	1	1	
PC-4	GW Contractor	X	1	1		1	1	1	1	
PC-18	GW Contractor	X	1	1		1	1	1	1	
PC-21A	GW Contractor	X	1	1		1	1	1	1	
PC-24	GW Contractor	X	1	1		1	1	1	1	
PC-28	GW Contractor	X	1	1		1	1	1	1	
PC-31	GW Contractor	X	1	1		1	1	1	1	
PC-37	GW Contractor	X	1	1		1	1	1	1	
PC-40	GW Contractor	X	1	1		1	1	1	1	
PC-50	GW Contractor	X	1	1		1	1	1	1	
PC-53	GW Contractor	X	1	1		1	1	1	1	
PC-54	GW Contractor	X	1	1		1	1	1	1	
PC-55	GW Contractor	X	1	1		1	1	1	1	
PC-56	GW Contractor	X	1	1		1	1	1	1	
PC-58	GW Contractor	X	1	1		1	1	1	1	
PC-59	GW Contractor	X	1	1		1	1	1	1	
PC-60	GW Contractor	X	1	1		1	1	1	1	
PC-62	GW Contractor	X	1	1		1	1	1	1	
PC-64	GW Contractor	X	1	1		1	1	1	1	
PC-65	GW Contractor	X	1	1		1	1	1	1	
PC-66	GW Contractor	X	1	1		1	1	1	1	

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Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
PC-67	GW Contractor	X	1	1		1	1	1	1	
PC-71	GW Contractor	X	1	1		1	1	1	1	
PC-72	GW Contractor	X	1	1		1	1	1	1	
PC-73	GW Contractor	X	1	1		1	1	1	1	
PC-74	GW Contractor	X	1			1	1	1	1	
PC-76	GW Contractor	X								
PC-77	GW Contractor	X	1			1	1	1	1	
PC-78	GW Contractor	X								
PC-79	GW Contractor	X	1	1		1	1	1	1	
PC-80	GW Contractor	X								
PC-81	GW Contractor	X								
PC-82	GW Contractor	X	1			1	1	1	1	
PC-83	GW Contractor	X								
PC-86	GW Contractor	X	1	1		1	1	1	1	
PC-87	GW Contractor	X								
PC-88	GW Contractor	X								
PC-90	GW Contractor	X	1	1		1	1	1	1	
PC-91	GW Contractor	X	1	1		1	1	1	1	
PC-94	GW Contractor	X	1	1		1	1	1	1	
PC-96	GW Contractor	X	1			1	1	1	1	
PC-97	GW Contractor	X	1	1		1	1	1	1	
PC-98R	GW Contractor	X	1	1		1	1	1	1	
PC-99R2/R3	GWETS Operator	X	1	1	1	1	1	1		
PC-101R	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
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Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
PC-103	GW Contractor	X	1	1		1	1	1	1	
PC-107	GW Contractor	X	1			1	1	1	1	
PC-108	GW Contractor	X	1			1	1	1	1	
PC-110	GW Contractor	X	1			1	1	1	1	
PC-115R	GWETS Operator	X	1	1	1	1	1	1		
PC-116R	GWETS Operator	X	1	1	1	1	1	1		
PC-117	GWETS Operator	X	1	1	1	1	1	1		
PC-118	GWETS Operator	X	1	1	1	1	1	1		
PC-119	GWETS Operator	X	1	1	1	1	1	1		
PC-120	GWETS Operator	X	1	1	1	1	1	1		
PC-121	GWETS Operator	X	1	1	1	1	1	1		
PC-122	GW Contractor	X	1	1		1	1	1	1	
PC-123	GW Contractor	X	1	1		1	1	1	1	
PC-124	GW Contractor	X	1	1		1	1	1	1	
PC-125	GW Contractor	X	1	1		1	1	1	1	
PC-126	GW Contractor	X	1	1		1	1	1	1	
PC-127	GW Contractor	X	1	1		1	1	1	1	
PC-128	GW Contractor	X	1	1		1	1	1	1	
PC-129	GW Contractor	X	1	1		1	1	1	1	
PC-130	GW Contractor	X	1	1		1	1	1	1	
PC-131	GW Contractor	X	1	1		1	1	1	1	
PC-132	GW Contractor	X	1	1		1	1	1	1	
PC-133	GWETS Operator	X	1	1	1	1	1	1		
PC-134A	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
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Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
PC-134D	GW Contractor	X	1	1		1	1	1	1	
PC-135A	GW Contractor	X	1	1		1	1	1	1	
PC-136	GW Contractor	X	1	1		1	1	1	1	
PC-137	GW Contractor	X	1	1		1	1	1	1	
PC-137D	GW Contractor	X	1	1		1	1	1	1	
PC-142	GW Contractor	X	1	1		1	1	1	1	
PC-143	GW Contractor	X	1	1		1	1	1	1	
PC-144	GW Contractor	X	1	1		1	1	1	1	
PC-145	GW Contractor	X	1	1		1	1	1	1	
PC-146	GW Contractor	X	1	1		1	1	1	1	See Note 1.
PC-147	GW Contractor	X	1	1		1	1	1	1	See Note 1.
PC-148	GW Contractor	X	1	1		1	1	1	1	
PC-149	GW Contractor	X	1	1		1	1	1	1	
PC-150	GWETS Operator	X	1	1	1	1	1	1		
PC-151	GW Contractor	X	1	1		1	1	1	1	
PC-152	GW Contractor	X	1	1		1	1	1	1	
PC-153	GW Contractor	X	1	1		1	1	1	1	
PC-154	GW Contractor	X	1	1		1	1	1	1	
PC-155A	GW Contractor	X	1	1		1	1	1	1	
PC-155B	GW Contractor	X	1	1		1	1	1	1	
PC-156A	GW Contractor	X	1	1		1	1	1	1	
PC-156B	GW Contractor	X	1	1		1	1	1	1	
PC-157A	GW Contractor	X	1	1		1	1	1	1	
PC-157B	GW Contractor	X	1	1		1	1	1	1	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
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Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
PC-158	GW Contractor	X	1	1		1	1	1	1	
PC-159	GW Contractor	X	1	1		1	1	1	1	
PC-160	GW Contractor	X	1	1		1	1	1	1	
TR-1	GW Contractor	X	1	1		1	1	1	1	
TR-2	GW Contractor	X	1	1		1	1	1	1	
TR-3	GW Contractor	X	1	1		1	1	1	1	
TR-4	GW Contractor	X	1	1		1	1	1	1	
TR-5	GW Contractor	X	1	1		1	1	1	1	
TR-6	GW Contractor	X	1	1		1	1	1	1	
TR-7	GW Contractor	X	1	1		1	1	1	1	
TR-8	GW Contractor	X	1	1		1	1	1	1	
TR-9	GW Contractor	X	1	1		1	1	1	1	
TR-10	GW Contractor	X	1	1		1	1	1	1	
TR-11	GW Contractor	X	1	1		1	1	1	1	
TR-12	GW Contractor	X	1	1		1	1	1	1	
TB-#	GW Contractor								26	Trip Blank. See Note 6.
EB-1	GWETS Operator		1	1	1	1	1	1		Equipment Blank. See Note 7.
EB-2	GWETS Operator		1	1	1	1	1	1		Equipment Blank. See Note 7.
EB-3	GWETS Operator		1	1	1	1	1	1		Equipment Blank. See Note 7.
EB-4	GW Contractor		1	1	1	1	1	1	1	Equipment Blank. See Note 7.
EB-5	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-6	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-7	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-8	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
EB-9	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-10	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-11	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-12	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-13	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-14	GW Contractor		1	1		1	1	1	1	Equipment Blank. See Note 7.
EB-15	GW Contractor		1			1	1	1	1	Equipment Blank. See Note 7.
FB-1	GWETS Operator		1	1	1	1	1	1		Field Blank. See Note 7.
FB-2	GWETS Operator		1	1	1	1	1	1		Field Blank. See Note 7.
FB-3	GWETS Operator		1	1	1	1	1	1		Field Blank. See Note 7.
FB-4	GW Contractor		1	1	1	1	1	1	1	Field Blank. See Note 7.
FB-5	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-6	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-7	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-8	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-9	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-10	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-11	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-12	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-13	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-14	GW Contractor		1	1		1	1	1	1	Field Blank. See Note 7.
FB-15	GW Contractor		1			1	1	1	1	Field Blank. See Note 7.
FD-1	GWETS Operator		1	1	1	1	1	1		Field Duplicate. See Note 7.
FD-2	GWETS Operator		1	1	1	1	1	1		Field Duplicate. See Note 7.

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	
FD-3	GWETS Operator		1	1	1	1	1	1		Field Duplicate. See Note 7.
FD-4	GW Contractor		1	1	1	1	1	1	1	Field Duplicate. See Note 7.
FD-5	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-6	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-7	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-8	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-9	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-10	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-11	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-12	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-13	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-14	GW Contractor		1	1		1	1	1	1	Field Duplicate. See Note 7.
FD-15	GW Contractor		1			1	1	1	1	Field Duplicate. See Note 7.
Total Samples		302	319	295	69	319	319	319	288	

TABLE 5: ANNUAL GROUNDWATER MONITORING PROGRAM SUMMARY
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Party Responsible for Sampling	DTW	Chlorate	Chromium	Chromium, Hexavalent	Nitrate as N	Perchlorate	TDS	VOCs	Comments
		NA	EPA 300.1 (no field filtration)	EPA 200.7 (no field filtration)	EPA 218.6 (no field filtration)	EPA 300.0 (no field filtration)	EPA 314.0 (no field filtration)	SM 2540C (no field filtration)	EPA 8260B (8260B SIM for 1,2,3-TCP, 1,4-Dioxane) (no field filtration)	

Notes:

DTW = depth to water
GW Contractor = groundwater sampling contractor
GWETS Operator = groundwater extraction and treatment system operator
NPDES = National Pollutant Discharge Elimination System
NA = not applicable
RCRA = Resource Conservation and Recovery Act
TDS = total dissolved solids
UIC = Underground Injection Control
VOCs = volatile organic compounds

1. Recent monitoring events indicate this well is dry (i.e. groundwater elevation is below the bottom of the well screen elevation). The well will continue to be monitored as part of the Groundwater Monitoring Program, but samples will only be collected if the water level is determined to be above the bottom of the well screen.
2. Analytical samples will be collected at whichever extraction well within a pair of buddy wells is actively pumping at the time of sampling. DTW will be measured at both wells within a pair of buddy wells.
3. The 4 RCRA wells (H-28A, M-5A, M-6A, M-7B) are sampled as part of the groundwater monitoring program only in second quarter (annual event) and third quarter (quarterly event). They are not sampled in first quarter (quarterly event). Additional analyses required by RCRA are total boron, chloride, total iron, total manganese, phenols, total sodium, specific conductance, sulfate, total organic carbon, and total organic halides (4 replicates).
4. Well M-10 is sampled for additional analytes per the NPDES permit (ammonia as nitrogen, total arsenic, total boron, chloride, total iron, total manganese, nitrate as nitrogen, nitrite as nitrogen, total inorganic nitrogen, total selenium).
5. Water level cannot be measured due to obstruction caused by a permanently installed pump. Analytical measurements are not impacted by the obstruction and will continue to be collected.
6. One per shipment containing VOCs. Assumed number of VOC-containing shipments in this table is 26. Trip blanks should be analyzed for VOCs, as indicated in this table.
7. Quality Assurance/Quality Control (QA/QC) samples (equipment blanks, field blanks, and field duplicates) should be collected at wells where primary samples are analyzed for the same suite of analytes required for the QA/QC sample.

TABLE 6: SUMMARY OF WELL CONSTRUCTION INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
AA-01	BRC	830921.03	26720238.72	1757.2	1755.0	NA	2.1	31.1 - 51.1	4	Sch 80 PVC	Monitoring
AA-11	BRC	830672.55	26725458.88	1660.0	1658.2	NA	1.8	10.8 - 30.8	4	Sch 80 PVC	Monitoring
ARP-1	NERT	828592.90	26728365.67	1613.4	1613.5	44.2	-0.0	14.0 - 44.0	2	PVC	Monitoring
ARP-2A	NERT	828722.79	26728404.69	1614.3	1614.7	54.0	-0.3	23.4 - 53.4	2	PVC	Monitoring
ARP-3A	NERT	828856.07	26728403.15	1614.7	1615.0	41.0	-0.2	20.5 - 40.5	2	PVC	Monitoring
ARP-4A	NERT	829167.66	26728412.05	1615.6	1615.7	33.0	-0.1	17.6 - 32.6	2	PVC	Monitoring
ARP-5A	NERT	829374.74	26728458.50	1616.2	1616.5	38.0	-0.3	12.4 - 37.4	2	PVC	Monitoring
ARP-6B	NERT	829520.19	26728500.05	1615.5	1615.9	43.0	-0.4	27.3 - 42.3	2	PVC	Monitoring
ARP-7	NERT	829667.95	26728501.24	1613.7	1614.6	39.2	-0.9	13.1 - 38.1	2	PVC	Monitoring
ART-1	NERT	828543.85	26728123.31	1614.6	1615.8	56.0	-1.2	12.8 - 52.8	6	PVC	Extraction
ART-1A	NERT	828536.31	26728122.63	1614.5	1615.8	56.0	-1.3	17.7 - 52.7	8	PVC	Extraction
ART-2	NERT	828624.98	26728085.20	1617.2	1618.3	56.0	-1.1	17.9 - 52.9	6	PVC	Extraction
ART-2A	NERT	828618.40	26728086.04	1616.9	1618.0	58.0	-1.1	19.9 - 54.9	8	PVC	Extraction
ART-3	NERT	828774.66	26728085.42	1618.0	1619.0	48.3	-1.0	15.3 - 45.3	6	PVC	Extraction
ART-3A	NERT	828768.51	26728085.09	1617.7	1618.9	55.0	-1.3	16.7 - 51.7	8	PVC	Extraction
ART-4	NERT	828850.09	26728085.58	1617.5	1618.6	46.4	-1.1	18.3 - 43.3	6	PVC	Extraction
ART-4A	NERT	828844.20	26728085.04	1617.5	1618.6	45.4	-1.1	17.3 - 42.3	8	PVC	Extraction
ART-6	NERT	829472.70	26728140.74	1615.5	1620.1	39.9	-4.7	13.3 - 33.3	6	PVC	Extraction
ART-7A	NERT	829582.58	26728143.61	1614.8	1618.4	41.7	-3.6	16.1 - 36.1	8	PVC	Extraction
ART-7B	NERT	829576.41	26728151.56	1615.9	1618.2	49.9	-2.3	27.5 - 42.5	8	PVC	Extraction
ART-8	NERT	828697.18	26728084.46	1617.7	1618.9	50.5	-1.2	16.8 - 46.8	6	PVC	Extraction
ART-8A	NERT	828691.54	26728083.80	1617.2	1619.0	54.0	-1.8	20.3 - 50.3	8	PVC	Extraction
ART-9	NERT	829525.85	26728143.91	1615.0	1618.8	45.5	-3.8	19.2 - 39.2	8	PVC	Extraction
DBMW-4	BRC	832295.68	26729903.39	1605.8	1603.5	43.7	2.8	12.3 - 32.3	4	PVC	Monitoring
H-11	Stauffer	826574.18	26714839.94	1862.7	1867.1	116.0	1.4	88.9 - 98.6	10	Steel	Monitoring
H-28A	Stauffer	825871.29	26721021.64	1732.9	1731.1	45.4	1.9	30.1 - 47.3	6	Steel	Monitoring
H-48	Stauffer	825658.20	26723952.93	1684.3	1681.7	33.7	2.6	35.3 - 45.3	NA	NA	Monitoring

TABLE 6: SUMMARY OF WELL CONSTRUCTION INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
H-58A	Stauffer	825642.54	26723331.95	1693.4	1691.0	57.0	2.4	39.4 - 59.4	4	PVC	Monitoring
HM-2	NA	832227.03	26731037.68	1587.1	1586.0	35.2	NA	NA	NA	NA	Monitoring
HMW-13	COH	827711.60	26731739.56	1595.1	1592.7	NA	2.4	12.4 - 27.4	NA	NA	Monitoring
HMW-14	COH	827173.59	26731535.56	1600.6	1598.9	39.0	1.7	16.3 - 35.2	NA	NA	Monitoring
HMW-15	COH	827608.51	26729900.79	1612.0	1608.7	25.4	3.3	10.7 - 24.9	NA	NA	Monitoring
HMW-16	COH	827090.14	26728531.10	1620.7	1621.1	26.3	-0.4	6.7 - 21.8	2	PVC	Monitoring
I-AA	NERT	827173.97	26719770.92	1754.1	1751.3	45.6	2.8	26.7 - 47.0	6	PVC	Extraction
I-AB	NERT	827224.66	26719789.97	1754.1	1751.6	51.0	2.6	27.0 - 46.1	6	PVC	Extraction
I-AC	NERT	828790.46	26719887.81	1752.8	1750.1	49.1	2.7	27.2 - 46.4	6	PVC	Extraction
I-AD	NERT	828804.89	26719793.31	1755.5	1753.1	50.3	2.4	28.1 - 47.3	6	PVC	Extraction
I-AR	NERT	827414.31	26719429.80	1758.4	1757.9	44.0	0.5	25.5 - 44.5	18	Steel	Extraction
I-B	NERT	827282.89	26719808.15	1752.9	1751.5	42.8	1.4	17.5 - 44.0	6	PVC	Extraction
I-C	NERT	827486.24	26719792.31	1752.7	1751.4	44.1	1.3	15.6 - 44.4	6	PVC	Extraction
I-D	NERT	827581.85	26719806.35	1752.8	1750.1	44.9	2.7	18.9 - 47.2	6	PVC	Extraction
I-E	NERT	827733.17	26719826.67	1752.5	1749.5	43.7	2.9	16.6 - 45.5	6	PVC	Extraction
I-F	NERT	827879.59	26719845.82	1749.3	1747.8	44.4	1.5	14.5 - 45.9	6	PVC	Extraction
I-G	NERT	828030.23	26719866.97	1752.7	1749.5	38.0	3.2	10.9 - 40.3	6	PVC	Extraction
I-H	NERT	828177.51	26719887.57	1753.3	1750.5	42.7	2.8	15.4 - 44.8	6	PVC	Extraction
I-I	NERT	828374.98	26719914.61	1745.1	1742.3	39.1	2.7	14.0 - 41.8	6	PVC	Extraction
I-J	NERT	828573.72	26719940.22	1750.1	1746.2	39.8	3.9	13.3 - 42.7	6	PVC	Extraction
I-K	NERT	828737.55	26719962.98	1746.0	1744.7	35.1	1.3	6.9 - 35.4	6	PVC	Extraction
I-L	NERT	827352.20	26719803.12	1751.7	1748.5	38.4	3.2	11.0 - 40.9	6	PVC	Extraction
I-M	NERT	827669.53	26719817.15	1753.0	1749.3	39.3	3.8	12.1 - 41.4	6	PVC	Extraction
I-N	NERT	827802.31	26719837.99	1751.2	1747.6	36.4	3.7	9.2 - 38.9	6	PVC	Extraction
I-O	NERT	828262.98	26719898.32	1752.9	1749.2	38.6	3.8	10.9 - 40.1	6	PVC	Extraction
I-P	NERT	828221.61	26719892.08	1751.7	1749.2	44.4	2.5	18.2 - 46.9	6	PVC	Extraction
I-Q	NERT	827952.21	26719855.30	1752.1	1749.6	37.8	2.5	11.6 - 40.3	6	PVC	Extraction

TABLE 6: SUMMARY OF WELL CONSTRUCTION INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
I-R	NERT	827315.52	26719801.64	1751.4	1749.2	41.4	2.2	15.1 - 43.6	6	PVC	Extraction
I-S	NERT	827403.53	26719800.34	1750.3	1748.5	45.5	1.8	15.2 - 44.2	6	PVC	Extraction
I-T	NERT	828074.17	26719871.41	1752.0	1749.4	44.9	2.6	15.8 - 44.7	6	PVC	Extraction
I-U	NERT	828117.88	26719880.91	1752.0	1749.6	44.6	2.4	15.0 - 44.0	6	PVC	Extraction
I-V	NERT	828326.14	26719895.44	1752.1	1750.0	44.5	2.1	14.6 - 43.6	6	PVC	Extraction
I-W	NERT	828245.24	26719896.07	1751.3	1749.0	50.1	2.4	23.6 - 52.5	6	PVC	Extraction
I-X	NERT	827839.66	26719843.31	1748.5	1746.7	49.6	1.8	22.9 - 51.4	6	PVC	Extraction
I-Y	NERT	827333.81	26719800.97	1751.3	1748.8	49.5	2.5	23.5 - 52.0	6	PVC	Extraction
I-Z	NERT	828467.74	26719922.96	1743.8	1742.3	36.5	1.5	18.1 - 38.0	4	PVC	Extraction
M-2A	NERT	827984.27	26718769.87	1781.3	1780.3	45.8	1.0	37.7 - 46.7	2	Steel	Monitoring
M-5A	NERT	826178.84	26719961.19	1751.8	1749.3	50.0	2.6	42.6 - 52.6	3	PVC	Monitoring
M-6A	NERT	825984.28	26721013.81	1733.3	1731.2	43.6	2.0	28.8 - 43.5	2	PVC	Monitoring
M-7B	NERT	826105.95	26720979.77	1732.9	1730.6	52.5	2.3	27.8 - 52.8	2	PVC	Monitoring
M-10	NERT	828536.01	26716636.94	1835.1	1833.9	67.0	1.2	44.2 - 64.2	5	Steel	Monitoring
M-11	NERT	828616.62	26717608.73	1815.2	1813.7	58.0	1.5	34.5 - 54.5	5	Steel	Monitoring
M-12A	NERT	828178.35	26717575.57	1812.5	1812.9	50.0	-0.3	39.7 - 49.7	3	PVC	Monitoring
M-13	NERT	827805.72	26717477.79	1815.0	1813.0	52.5	2.0	30.0 - 50.0	5	Steel	Monitoring
M-14A	NERT	827045.20	26719382.55	1760.9	1758.5	40.2	2.4	22.4 - 42.4	2	PVC	Monitoring
M-19	NERT	828845.96	26719350.00	1766.9	1764.5	39.5	2.4	16.9 - 36.9	2	PVC	Monitoring
M-21	NERT	827792.73	26718359.25	1792.2	1790.6	43.0	1.6	19.6 - 39.6	2	PVC	Monitoring
M-22A	NERT	828269.84	26719531.96	1759.5	1759.0	36.4	0.5	16.5 - 36.5	2	PVC	Monitoring
M-23	NERT	827373.84	26721391.19	1720.6	1717.3	42.4	3.3	12.7 - 40.7	2	PVC	Monitoring
M-25	NERT	827677.53	26719504.15	1760.0	1756.9	39.0	3.1	27.1 - 42.1	2	PVC	Monitoring
M-31A	NERT	828368.02	26718289.89	1797.0	1797.1	55.0	-0.1	34.9 - 54.9	2	PVC	Monitoring
M-32	NERT	828592.45	26718354.04	1795.6	1791.6	45.0	4.0	34.0 - 49.0	2	PVC	Monitoring
M-33	NERT	828783.71	26718383.18	1795.7	1791.8	45.0	3.9	33.9 - 48.9	2	PVC	Monitoring
M-35	NERT	828509.10	26718840.20	1772.9	1773.4	40.0	-0.5	24.5 - 39.5	2	PVC	Monitoring

TABLE 6: SUMMARY OF WELL CONSTRUCTION INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
M-36	NERT	828069.09	26719556.63	1759.8	1756.9	35.0	2.9	22.9 - 37.9	2	PVC	Monitoring
M-37	NERT	827414.06	26719422.28	1760.5	1758.0	35.0	2.5	22.5 - 37.5	2	PVC	Monitoring
M-38	NERT	827877.68	26719523.89	1759.8	1758.4	35.0	1.3	21.3 - 36.3	2	PVC	Monitoring
M-44	NERT	827005.36	26722699.10	1698.4	1695.9	35.0	2.5	7.5 - 37.5	2	PVC	Monitoring
M-48A	NERT	828292.90	26721338.13	1718.5	1718.6	40.0	-0.2	19.5 - 39.5	2	PVC	Monitoring
M-52	NERT	828394.11	26717985.41	1802.5	1799.3	45.0	3.2	37.7 - 47.7	2	PVC	Monitoring
M-55	NERT	827682.57	26719819.98	1751.0	1749.3	44.6	1.8	16.4 - 46.4	2	PVC	Monitoring
M-56	NERT	827980.00	26719859.76	1750.9	1749.5	40.0	1.4	16.4 - 41.4	2	PVC	Monitoring
M-57A	NERT	826992.99	26719716.67	1753.4	1751.4	40.2	2.1	22.1 - 42.1	2	PVC	Monitoring
M-58	NERT	828276.43	26719900.79	1751.3	1749.0	45.0	2.4	17.4 - 47.4	2	PVC	Monitoring
M-60	NERT	828079.02	26719872.88	1751.0	1749.5	43.0	1.6	19.4 - 44.4	2	PVC	Monitoring
M-64	NERT	827599.59	26719695.77	1752.4	1752.6	37.5	-0.3	12.4 - 37.0	2	PVC	Monitoring
M-65	NERT	827899.49	26719746.61	1754.0	1752.1	39.2	1.9	16.3 - 40.9	2	PVC	Monitoring
M-66	NERT	828183.42	26719787.55	1754.4	1751.6	42.5	2.7	20.2 - 45.0	2	PVC	Monitoring
M-67	NERT	828508.35	26719830.00	1746.0	1744.1	38.0	1.9	9.7 - 39.7	2	PVC	Monitoring
M-68	NERT	828750.88	26719864.83	1750.4	1748.4	41.0	2.0	13.2 - 41.8	2	PVC	Monitoring
M-69	NERT	827265.44	26719885.82	1749.8	1748.0	39.5	1.9	21.8 - 41.2	2	PVC	Monitoring
M-70	NERT	827567.16	26719904.68	1748.3	1746.8	40.2	1.5	16.8 - 41.5	2	PVC	Monitoring
M-71	NERT	827859.30	26719943.70	1747.1	1744.9	42.2	2.2	19.7 - 44.2	2	PVC	Monitoring
M-72	NERT	828171.94	26719977.31	1746.5	1745.0	35.0	1.5	11.6 - 36.3	2	PVC	Monitoring
M-73	NERT	828427.46	26720018.54	1741.3	1742.2	36.0	-0.9	10.1 - 34.9	2	PVC	Monitoring
M-74	NERT	828713.43	26720062.52	1745.2	1742.4	39.0	2.8	12.0 - 41.6	2	PVC	Monitoring
M-75	NERT	827718.66	26718702.91	1784.2	1782.1	51.5	2.1	36.7 - 51.4	2	PVC	Monitoring
M-76	NERT	827550.42	26718660.25	1785.2	1781.7	51.4	3.5	38.1 - 52.8	2	PVC	Monitoring
M-77	NERT	828931.86	26718046.10	1801.8	1798.2	45.9	3.6	32.6 - 47.4	2	PVC	Monitoring
M-78	NERT	827777.18	26719838.28	1751.5	1749.5	43.6	2.0	23.5 - 43.5	2	PVC	Monitoring
M-79	NERT	827381.95	26720049.07	1744.9	1743.3	37.6	1.6	12.4 - 37.0	2	PVC	Monitoring

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Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
M-80	NERT	827759.54	26720113.16	1746.2	1744.0	43.7	2.1	13.6 - 43.6	2	PVC	Monitoring
M-81A	NERT	828139.49	26720176.91	1744.2	1743.1	40.0	1.1	31.1 - 41.1	3	PVC	Monitoring
M-83	NERT	827584.72	26720160.56	1742.2	1739.0	42.5	3.2	14.0 - 43.5	2	PVC	Monitoring
M-92	NERT	827137.55	26717532.14	1800.8	1798.3	45.5	2.5	37.4 - 47.4	2	PVC	Monitoring
M-93	NERT	827143.16	26717686.29	1797.6	1797.7	46.0	-0.1	35.3 - 45.3	2	PVC	Monitoring
M-95	NERT	827426.47	26722701.98	1694.1	1695.1	22.0	-1.0	11.0 - 21.0	2	PVC	Monitoring
M-96	NERT	827625.78	26722700.54	1693.9	1694.3	20.5	-0.4	10.2 - 20.2	2	PVC	Monitoring
M-97	NERT	827492.18	26717795.28	1800.9	1798.6	45.5	2.4	37.4 - 47.4	2	PVC	Monitoring
M-98	NERT	826873.01	26720914.11	1731.9	1731.4	31.0	0.5	19.5 - 29.5	2	PVC	Monitoring
M-99	NERT	827309.23	26720851.81	1730.8	1729.0	33.0	1.8	17.8 - 32.8	2	PVC	Monitoring
M-100	NERT	827659.68	26720820.40	1731.0	1729.0	30.5	2.0	21.0 - 31.0	2	PVC	Monitoring
M-101	NERT	828060.54	26720786.96	1730.9	1729.2	29.0	1.7	18.7 - 28.7	2	PVC	Monitoring
M-103	NERT	828727.97	26715622.71	1866.9	1864.4	90.0	2.5	72.0 - 92.0	2	PVC	Monitoring
M-115	NERT	827243.41	26718612.95	1783.2	1781.1	45.2	2.1	37.1 - 47.1	2	PVC	Monitoring
M-117	NERT	828916.75	26715198.67	1880.5	1878.1	155.0	2.4	132.4 - 152.4	2	PVC	Monitoring
M-118	NERT	828036.21	26715068.38	1876.8	1874.5	163.0	2.4	140.4 - 160.4	2	PVC	Monitoring
M-120	NERT	828387.52	26715163.04	1878.6	1875.9	105.0	2.8	82.8 - 102.8	2	PVC	Monitoring
M-121	NERT	827694.20	26715011.51	1875.7	1873.1	102.0	2.6	79.6 - 99.6	2	PVC	Monitoring
M-123	NERT	826514.08	26718415.73	1785.2	1782.5	51.3	2.7	38.7 - 53.7	2	PVC	Monitoring
M-124	NERT	827089.92	26718225.15	1787.6	1785.3	49.3	2.3	36.3 - 51.3	2	PVC	Monitoring
M-125	NERT	826529.55	26718992.85	1771.4	1768.6	50.3	2.9	37.9 - 52.9	2	PVC	Monitoring
M-126	NERT	826569.21	26719505.96	1759.1	1756.4	40.0	2.7	22.4 - 42.4	2	PVC	Monitoring
M-129	NERT	828806.21	26720079.71	1747.4	1747.7	40.0	-0.3	19.7 - 39.7	2	PVC	Monitoring
M-132	NERT	828714.34	26720048.87	1744.6	1742.6	90.0	2.0	81.7 - 91.7	2	PVC	Monitoring
M-133	NERT	828698.45	26720067.45	1743.8	1741.4	70.0	2.4	62.1 - 72.1	2	PVC	Monitoring
M-134	NERT	827144.11	26719889.30	1752.2	1749.6	70.0	2.6	62.3 - 72.3	2	PVC	Monitoring
M-135	NERT	827154.22	26719890.23	1752.0	1749.4	39.0	2.6	31.3 - 41.3	2	PVC	Monitoring

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Nevada Environmental Response Trust Site
Henderson, Nevada

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M-136	NERT	827165.06	26719889.88	1752.0	1749.3	90.0	2.7	82.4 - 92.4	2	PVC	Monitoring
M-137	NERT	827665.77	26716034.31	1847.7	1844.9	75.0	2.8	54.8 - 74.8	2	PVC	Monitoring
M-138	NERT	827816.09	26716058.52	1846.5	1843.8	65.5	2.7	53.2 - 68.2	2	PVC	Monitoring
M-139	NERT	829044.40	26717213.17	1813.3	1813.8	60.0	-0.6	44.4 - 59.4	2	PVC	Monitoring
M-140	NERT	827427.02	26719888.37	1748.3	1745.8	43.9	2.5	26.6 - 46.4	4	PVC	Monitoring
M-141	NERT	828465.30	26718195.39	1797.3	1797.5	49.5	-0.2	39.4 - 49.4	2	PVC	Monitoring
M-142	NERT	827189.62	26718711.81	1773.7	1774.0	45.3	-0.3	29.7 - 44.7	2	PVC	Monitoring
M-144	NERT	827644.52	26717026.09	1813.4	1813.3	45.0	0.1	35.1 - 45.1	2	PVC	Monitoring
M-145	NERT	829203.27	26717449.32	1812.3	1812.7	60.0	-0.4	44.6 - 59.6	2	PVC	Monitoring
M-147	NERT	828824.13	26718858.23	1777.6	1775.1	40.0	2.5	27.5 - 42.5	2	PVC	Monitoring
M-148A	NERT	829028.31	26718355.61	1800.1	1797.8	50.0	2.3	42.0 - 52.0	2	PVC	Monitoring
M-149	NERT	828373.07	26718285.86	1797.0	1797.2	120.0	-0.3	99.8 - 119.8	2	PVC	Monitoring
M-150	NERT	828058.93	26719569.89	1759.1	1756.5	145.0	2.7	127.7 - 147.7	2	PVC	Monitoring
M-151	NERT	827642.71	26720826.91	1731.1	1728.4	145.0	2.7	127.7 - 147.7	2	PVC	Monitoring
M-152	NERT	826973.43	26722690.77	1698.6	1695.8	145.0	2.8	127.8 - 147.8	2	PVC	Monitoring
M-153	NERT	828385.56	26718288.14	1797.0	1797.2	170.0	-0.2	149.8 - 169.8	2	PVC	Monitoring
M-154	NERT	828047.55	26719568.47	1759.1	1756.5	195.0	2.5	177.5 - 197.5	2	PVC	Monitoring
M-155	NERT	827635.93	26720827.55	1731.2	1728.3	220.0	2.9	202.9 - 222.9	2	PVC	Artesian
M-156	NERT	826964.14	26722690.79	1698.5	1695.9	195.0	2.6	177.6 - 197.6	2	PVC	Monitoring
M-161	NERT	827132.17	26719888.93	1752.5	1749.9	110.0	2.6	102.3 - 112.3	2	PVC	Monitoring
M-161D	NERT	827237.32	26719894.14	1750.4	1747.8	140.0	2.6	132.6 - 142.6	4	PVC	Monitoring
M-162	NERT	827876.08	26719944.83	1747.9	1745.7	110.0	2.2	101.9 - 111.9	2	PVC	Monitoring
M-162D	NERT	827774.06	26719954.88	1747.4	1745.0	140.0	2.4	132.3 - 142.0	4	PVC	Monitoring
M-163	NERT	827871.62	26719937.88	1748.0	1745.6	90.0	2.3	82.0 - 92.0	2	PVC	Monitoring
M-164	NERT	827868.37	26719948.34	1747.7	1745.2	70.0	2.5	62.2 - 72.2	2	PVC	Monitoring
M-165	NERT	828699.53	26720052.05	1743.9	1741.6	120.0	2.3	112.0 - 122.0	2	PVC	Monitoring
M-166	NERT	827228.06	26719778.37	1751.1	1751.5	32.0	-0.4	21.3 - 31.3	2	PVC	Monitoring

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Henderson, Nevada

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M-167	NERT	827335.79	26719786.68	1750.0	1749.8	30.0	0.2	19.9 - 29.9	2	PVC	Monitoring
M-168	NERT	827406.15	26719787.39	1748.5	1748.8	32.0	-0.4	21.3 - 31.3	2	PVC	Monitoring
M-169	NERT	827467.43	26719785.56	1750.4	1750.7	35.0	-0.3	24.4 - 34.4	2	PVC	Monitoring
M-170	NERT	827575.63	26719795.30	1750.7	1750.6	35.0	0.2	24.9 - 34.9	2	PVC	Monitoring
M-172	NERT	827893.02	26719834.69	1750.6	1750.4	37.0	0.2	26.9 - 36.9	2	PVC	Monitoring
M-173	NERT	828180.01	26719874.39	1749.9	1749.7	40.0	0.1	24.8 - 39.8	2	PVC	Monitoring
M-174	NERT	828377.26	26719901.68	1742.3	1742.3	28.0	0.0	17.7 - 27.7	2	PVC	Monitoring
M-175	NERT	828469.49	26719909.88	1742.8	1742.9	29.0	-0.1	18.6 - 28.6	2	PVC	Monitoring
M-176	NERT	828584.65	26719946.78	1745.5	1745.6	30.0	-0.2	19.5 - 29.5	2	PVC	Monitoring
M-177	NERT	828723.17	26719964.47	1743.3	1743.6	30.0	-0.3	19.4 - 29.4	2	PVC	Monitoring
M-181	NERT	828814.45	26719578.25	1761.7	1759.4	115.0	2.4	107.1 - 117.1	2	PVC	Monitoring
M-182	NERT	828813.66	26719587.42	1761.8	1759.4	90.0	2.4	82.1 - 92.1	2	PVC	Monitoring
M-186	NERT	829020.45	26718354.57	1800.7	1798.0	115.0	2.7	107.4 - 117.4	2	PVC	Monitoring
M-186D	NERT	829025.47	26718347.71	1801.0	1798.2	173.0	2.8	155.8 - 175.8	4	PVC	Monitoring
M-189	NERT	828371.68	26717101.15	1812.7	1813.2	50.0	-0.5	34.5 - 49.5	2	PVC	Monitoring
M-190	NERT	828816.08	26717162.21	1813.1	1813.5	50.0	-0.4	34.6 - 49.6	2	PVC	Monitoring
M-191	NERT	828087.37	26717253.90	1813.1	1813.6	50.0	-0.5	34.5 - 49.5	2	PVC	Monitoring
M-192	NERT	828393.70	26717297.61	1812.8	1813.2	50.0	-0.4	34.6 - 49.6	2	PVC	Monitoring
M-193	NERT	828805.62	26717398.60	1812.7	1813.1	50.0	-0.4	34.6 - 49.6	2	PVC	Monitoring
MC-3	Stauffer	825209.51	26721410.04	1725.8	1725.0	43.4	0.9	36.3 - 44.3	2	PVC	Monitoring
MC-6	Stauffer	825207.81	26722160.32	1713.4	1711.4	37.2	2.0	20.9 - 39.2	2	PVC	Monitoring
MC-7	Stauffer	824932.95	26721865.47	1718.7	1717.3	39.2	1.5	31.6 - 40.7	2	PVC	Monitoring
MC-50	NERT	825534.54	26722076.12	1713.3	1712.0	49.0	1.3	25.3 - 50.3	2	PVC	Monitoring
MC-51	NERT	825647.56	26721899.90	1716.0	1714.9	49.0	1.1	25.1 - 50.1	2	PVC	Monitoring
MC-53	NERT	825942.19	26721919.75	1715.3	1713.7	40.0	1.6	21.6 - 41.6	2	PVC	Monitoring
MC-65	Stauffer	826119.15	26722421.12	1705.5	1703.7	41.0	1.8	21.8 - 42.8	2	PVC	Monitoring
MC-69	Stauffer	825235.31	26721806.95	1718.7	1717.0	44.0	1.8	30.8 - 45.8	2	PVC	Monitoring

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MC-93	Stauffer	825948.58	26721673.10	1719.3	1718.0	42.0	1.4	33.4 - 43.4	NA	NA	Monitoring
MC-97	Stauffer	825838.31	26721425.70	1724.0	1723.1	41.0	0.9	31.9 - 41.9	2	PVC	Monitoring
MW-16	NERT	826447.19	26719904.81	1754.8	1752.3	40.0	2.6	27.3 - 42.3	2	PVC	Monitoring
MW-K4	AMPAC	828994.26	26728410.91	1614.9	1615.4	50.0	-0.5	9.0 - 49.5	2	PVC	Monitoring
MW-K5	AMPAC	829617.63	26730252.26	1598.9	1595.7	44.0	3.3	31.8 - 47.3	2	PVC	Monitoring
PC-1	NERT	830924.52	26730308.93	1598.3	1598.0	30.0	0.3	15.0 - 30.0	2	PVC	Monitoring
PC-2	NERT	830443.03	26730209.92	1596.3	1594.7	32.0	1.7	18.4 - 33.4	2	PVC	Monitoring
PC-4	NERT	831171.41	26730353.96	1599.5	1597.6	43.0	1.9	19.6 - 44.6	2	PVC	Monitoring
PC-18	NERT	828635.95	26728080.09	1618.6	1618.5	52.0	0.0	11.5 - 51.5	2	PVC	Monitoring
PC-21A	NERT	829267.40	26721336.03	1724.7	1722.7	34.4	2.0	16.0 - 36.0	2	PVC	Monitoring
PC-24	NERT	829523.90	26726730.09	1633.6	1634.1	30.2	-0.5	14.5 - 29.5	2	PVC	Monitoring
PC-28	NERT	828530.30	26725375.96	1650.8	1651.2	20.0	-0.4	9.6 - 19.1	2	PVC	Monitoring
PC-31	NERT	826781.39	26725196.08	1657.9	1658.2	50.0	-0.3	14.3 - 49.3	2	PVC	Monitoring
PC-37	NERT	826611.96	26722172.38	1707.8	1706.6	42.0	1.2	18.0 - 43.0	2	PVC	Monitoring
PC-40	NERT	826476.67	26723971.13	1679.1	1676.9	55.2	2.2	17.2 - 57.2	2	PVC	Monitoring
PC-50	NERT	828326.61	26726722.56	1633.5	1633.8	42.0	-0.3	11.5 - 41.5	2	PVC	Monitoring
PC-53	NERT	829940.98	26730225.73	1595.2	1593.5	33.0	1.7	14.7 - 34.2	2	PVC	Monitoring
PC-54	NERT	828296.24	26722067.82	1704.2	1704.4	35.0	-0.2	9.3 - 34.3	2	PVC	Monitoring
PC-55	NERT	828530.36	26728057.26	1618.6	1618.1	56.2	0.5	15.8 - 55.8	6	PVC	Monitoring
PC-56	NERT	830645.22	26732289.58	1576.7	1573.5	55.0	3.1	7.9 - 57.9	2	PVC	Monitoring
PC-58	NERT	831123.70	26732118.22	1576.5	1574.2	33.0	2.3	10.1 - 35.1	2	PVC	Monitoring
PC-59	NERT	830149.88	26732452.63	1575.9	1573.2	35.0	2.7	7.5 - 37.5	2	PVC	Monitoring
PC-60	NERT	830404.92	26732358.91	1576.2	1573.6	40.0	2.6	7.1 - 42.1	2	PVC	Monitoring
PC-62	NERT	829764.07	26732733.58	1575.6	1573.2	38.0	2.3	9.9 - 39.9	2	PVC	Monitoring
PC-64	NERT	827916.14	26723702.63	1675.3	1675.6	19.5	-0.3	3.7 - 18.7	2	PVC	Monitoring
PC-65	NERT	828386.88	26723682.68	1675.2	1676.1	19.1	-0.9	3.2 - 17.8	2	PVC	Monitoring
PC-66	NERT	828779.18	26723967.18	1673.7	1674.0	27.3	-0.4	6.5 - 26.5	2	PVC	Monitoring

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PC-67	NERT	829207.43	26723846.98	1674.0	1674.5	36.0	-0.5	10.5 - 35.1	2	PVC	Monitoring
PC-71	NERT	826805.51	26722688.17	1698.8	1696.2	30.4	2.6	16.0 - 31.0	2	PVC	Monitoring
PC-72	NERT	826604.40	26722688.80	1699.5	1696.9	37.0	2.6	17.6 - 37.6	2	PVC	Monitoring
PC-73	NERT	826404.59	26722695.23	1699.5	1697.5	47.5	2.0	22.0 - 47.0	2	PVC	Monitoring
PC-74	NERT	829203.18	26734003.83	1565.3	1564.6	50.0	0.7	40.2 - 50.2	2	PVC	Monitoring
PC-76	NERT	829183.40	26734007.04	1565.0	1564.6	20.5	0.5	15.5 - 20.5	2	PVC	Monitoring
PC-77	NERT	829031.24	26733568.34	1566.8	1566.8	40.0	0	29.5 - 39.5	2	PVC	Monitoring
PC-78	NERT	829032.96	26733560.54	1566.8	1566.9	22.0	-0.2	11.4 - 21.4	2	PVC	Monitoring
PC-79	NERT	829814.91	26733246.96	1573.2	1570.8	45.0	2.4	36.9 - 46.9	2	PVC	Monitoring
PC-80	NERT	829823.55	26733250.66	1573.5	1570.7	30.0	2.8	22.3 - 32.3	2	PVC	Monitoring
PC-81	NERT	829833.18	26733254.93	1573.5	1570.8	15.0	2.7	12.2 - 17.2	2	PVC	Monitoring
PC-82	NERT	830316.71	26733195.35	1568.7	1565.2	57.5	3.5	50.5 - 60.5	2	PVC	Monitoring
PC-83	NERT	830325.42	26733201.49	1568.9	1565.0	31.0	4.0	24.5 - 34.5	2	PVC	Monitoring
PC-86	NERT	830827.22	26733185.95	1561.1	1559.2	28.0	2.0	19.5 - 29.5	2	PVC	Monitoring
PC-87	NERT	830837.63	26733185.77	1561.2	1558.8	13.0	2.4	4.9 - 14.9	2	PVC	Monitoring
PC-88	NERT	831259.14	26733178.77	1550.8	1550.9	50.5	-0.1	39.9 - 49.9	2	PVC	Monitoring
PC-90	NERT	831271.57	26733192.94	1550.4	1550.6	15.0	-0.3	4.3 - 14.3	2	PVC	Monitoring
PC-91	NERT	831729.67	26733111.07	1552.3	1552.4	37.0	-0.1	26.4 - 36.4	2	PVC	Monitoring
PC-94	NERT	832188.68	26733122.78	1548.9	1549.1	20.0	-0.2	9.3 - 19.3	2	PVC	Monitoring
PC-96	NERT	830896.37	26733451.04	1552.4	1552.5	39.5	-0.2	28.9 - 38.9	2	PVC	Monitoring
PC-97	NERT	831565.43	26733441.67	1548.4	1548.9	33.5	-0.5	22.5 - 32.5	2	PVC	Monitoring
PC-98R	NERT	829522.36	26730261.00	1593.2	1593.2	40.5	-0.0	20.0 - 35.0	4	PVC	Monitoring
PC-99R2/R3	NERT	831258.35	26733155.60	1552.6	1551.7	54.4	0.9	12.1 - 50.4	6	PVC	Extraction
PC-101R	NERT	828711.65	26728107.93	1618.6	1618.9	50.5	-0.3	19.7 - 49.7	2	PVC	Monitoring
PC-103	NERT	829110.59	26730205.91	1599.4	1597.1	29.5	2.3	11.3 - 31.3	2	PVC	Monitoring
PC-107	NERT	827136.13	26729287.90	1614.3	1614.6	18.0	-0.3	7.4 - 17.4	2	PVC	Monitoring
PC-108	NERT	828526.51	26731913.27	1588.0	1584.8	45.0	3.1	12.8 - 47.8	2	PVC	Monitoring

TABLE 6: SUMMARY OF WELL CONSTRUCTION INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
PC-110	NERT	826777.94	26731928.09	1594.3	1591.6	37.0	2.6	9.3 - 39.3	2	PVC	Monitoring
PC-115R	NERT	831148.78	26733131.32	1554.8	1554.5	54.9	0.2	10.6 - 49.8	8	PVC	Extraction
PC-116R	NERT	831348.16	26733203.37	1552.1	1552.0	55.5	0.1	10.4 - 50.1	8	PVC	Extraction
PC-117	NERT	831421.87	26733275.36	1550.7	1550.8	51.7	-0.1	9.7 - 49.1	8	PVC/SS	Extraction
PC-118	NERT	831052.11	26733167.68	1553.1	1553.0	48.1	0.1	7.0 - 46.4	8	PVC/SS	Extraction
PC-119	NERT	830951.41	26733188.27	1553.1	1559.1	46.6	-6.0	8.7 - 38.2	8	PVC/SS	Extraction
PC-120	NERT	830851.92	26733186.43	1553.2	1558.6	47.0	-5.5	8.6 - 39.5	8	PVC/SS	Extraction
PC-121	NERT	830751.43	26733180.69	1554.1	1557.1	36.7	-3.0	3.8 - 33.7	8	PVC/SS	Extraction
PC-122	NERT	829674.87	26728145.44	1618.1	1618.5	38.0	-0.4	22.6 - 37.6	2	PVC	Monitoring
PC-123	NERT	829484.73	26727358.61	1626.6	1626.9	35.2	-0.3	19.7 - 34.7	2	PVC	Monitoring
PC-124	NERT	830132.64	26726741.67	1635.8	1636.4	35.5	-0.6	19.7 - 34.7	2	PVC	Monitoring
PC-125	NERT	829925.63	26726740.00	1635.2	1635.6	33.9	-0.4	18.3 - 33.3	2	PVC	Monitoring
PC-126	NERT	829724.56	26726737.98	1634.6	1634.9	34.7	-0.4	19.2 - 34.2	2	PVC	Monitoring
PC-127	NERT	829316.56	26726735.86	1632.5	1633.1	35.2	-0.6	14.4 - 34.4	2	PVC	Monitoring
PC-128	NERT	828953.82	26726732.52	1633.5	1633.8	35.0	-0.3	14.5 - 34.5	2	PVC	Monitoring
PC-129	NERT	828747.15	26726731.03	1634.0	1634.4	38.0	-0.4	12.4 - 37.4	2	PVC	Monitoring
PC-130	NERT	828538.02	26726729.58	1633.2	1633.7	50.0	-0.4	14.4 - 49.4	2	PVC	Monitoring
PC-131	NERT	828123.05	26726725.49	1633.6	1634.5	40.0	-0.8	9.0 - 39.0	2	PVC	Monitoring
PC-132	NERT	827913.71	26726723.41	1634.9	1635.2	40.0	-0.3	9.5 - 39.5	2	PVC	Monitoring
PC-133	NERT	831757.78	26733208.99	1550.2	1551.5	39.0	-1.3	1.5 - 36.2	4	PVC	Extraction
PC-134A	NERT	828775.55	26728143.21	1618.7	1618.9	70.0	-0.2	59.5 - 69.5	2	PVC	Monitoring
PC-134D	NERT	828857.10	26728169.65	1618.6	1618.8	90.0	-0.3	79.7 - 89.7	4	PVC	Monitoring
PC-135A	NERT	828767.26	26728143.10	1618.7	1619.0	51.0	-0.3	30.4 - 50.4	2	PVC	Monitoring
PC-136	NERT	829517.66	26728191.40	1618.4	1618.8	41.9	-0.5	21.3 - 41.3	2	PVC	Monitoring
PC-137	NERT	829517.49	26728199.02	1618.5	1618.9	73.3	-0.4	62.9 - 72.9	2	PVC	Monitoring
PC-137D	NERT	829522.54	26728198.37	1618.4	1618.8	90.0	-0.4	79.6 - 89.6	4	PVC	Monitoring
PC-142	NERT	828435.75	26728106.95	1619.7	1617.1	32.0	2.6	24.3 - 34.3	2	PVC	Monitoring

TABLE 6: SUMMARY OF WELL CONSTRUCTION INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
PC-143	NERT	828698.44	26728238.76	1619.3	1619.4	65.0	-0.1	29.7 - 64.7	2	PVC	Monitoring
PC-144	NERT	828903.52	26728223.91	1618.8	1619.0	40.0	-0.3	29.4 - 39.4	2	PVC	Monitoring
PC-145	NERT	829535.99	26728324.84	1618.0	1618.2	45.0	-0.2	24.5 - 44.5	2	PVC	Monitoring
PC-146	NERT	829812.50	26728152.12	1617.7	1618.0	30.0	-0.3	19.5 - 29.5	2	PVC	Monitoring
PC-147	NERT	829767.43	26728153.08	1617.7	1617.8	32.0	-0.1	21.6 - 31.6	2	PVC	Monitoring
PC-148	NERT	829249.15	26728124.48	1618.1	1618.2	44.5	-0.1	24.4 - 44.4	6	PVC	Monitoring
PC-149	NERT	829117.81	26728123.00	1619.1	1619.2	44.5	-0.1	24.4 - 44.4	6	PVC	Monitoring
PC-150	NERT	828915.05	26728104.19	1616.2	1618.6	44.8	-2.4	17.5 - 37.5	6	PVC	Extraction
PC-151	NERT	826961.71	26726718.50	1638.7	1638.9	28.0	-0.2	7.8 - 27.8	2	PVC	Monitoring
PC-152	NERT	827332.69	26726722.50	1637.0	1637.5	30.0	-0.4	9.6 - 29.6	2	PVC	Monitoring
PC-153	NERT	827665.97	26726720.80	1635.9	1636.2	30.0	-0.3	9.7 - 29.7	2	PVC	Monitoring
PC-154	NERT	827203.63	26728095.14	1624.8	1625.1	23.0	-0.3	7.7 - 22.7	2	PVC	Monitoring
PC-155A	NERT	830687.33	26734078.92	1555.6	1552.7	30.0	3.0	13.0 - 33.0	2	PVC	Monitoring
PC-155B	NERT	830681.56	26734087.49	1556.1	1552.9	48.0	3.2	41.2 - 51.2	2	PVC	Monitoring
PC-156A	NERT	831227.64	26733839.41	1549.8	1546.9	20.0	2.9	12.9 - 22.9	2	PVC	Monitoring
PC-156B	NERT	831219.96	26733845.83	1550.5	1547.1	45.0	3.4	28.4 - 48.4	2	PVC	Monitoring
PC-157A	NERT	831609.73	26733942.94	1548.1	1545.0	24.0	3.1	12.1 - 27.1	2	PVC	Monitoring
PC-157B	NERT	831603.72	26733956.02	1548.0	1545.0	40.0	3.1	33.1 - 43.1	2	PVC	Monitoring
PC-158	NERT	827714.08	26728109.91	1620.1	1620.4	22.0	-0.3	6.7 - 21.7	2	PVC	Monitoring
PC-159	NERT	827903.56	26728109.57	1620.3	1620.7	25.0	-0.4	9.6 - 24.6	2	PVC	Monitoring
PC-160	NERT	828112.16	26728119.66	1619.4	1617.7	24.0	1.7	10.7 - 25.7	2	PVC	Monitoring
TR-1	NERT	826167.58	26719958.10	1751.6	1749.6	312.0	2.0	283.5 - 313.5	4	PVC	Artesian
TR-2	NERT	826156.18	26719954.86	1751.7	1749.5	175.0	2.2	146.7 - 176.7	4	PVC	Monitoring
TR-3	NERT	826342.35	26718941.78	1772.5	1770.4	250.0	2.1	221.6 - 251.6	4	PVC	Artesian
TR-4	NERT	826342.03	26718951.73	1772.7	1770.2	145.0	2.5	127.0 - 147.0	4	PVC	Monitoring
TR-5	NERT	826595.48	26717592.36	1800.4	1797.8	251.5	2.6	223.6 - 253.6	4	PVC	Artesian
TR-6	NERT	826593.83	26717608.59	1800.4	1797.7	80.0	2.6	62.6 - 82.6	4	PVC	Monitoring

TABLE 6: SUMMARY OF WELL CONSTRUCTION INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	Owner	Easting	Northing	DTW Reference Elevation[1] (ft amsl)	Ground Elevation (ft amsl)	Well Depth (ft bgs)	Stick Up (ft)	Screened Interval (ft btoc)	Casing Diameter (inches)	Casing Material	Well Type
TR-7	NERT	826724.45	26716525.88	1829.1	1826.7	290.5	2.4	262.4 - 292.4	4	PVC	Monitoring
TR-8	NERT	826722.60	26716512.21	1829.3	1826.7	93.5	2.5	65.5 - 95.5	4	PVC	Monitoring
TR-9	NERT	827559.74	26715753.16	1854.4	1851.9	250.5	2.6	232.6 - 252.6	4	PVC	Monitoring
TR-10	NERT	827562.01	26715739.98	1854.2	1851.8	100.5	2.4	82.4 - 102.4	4	PVC	Monitoring
TR-11	NERT	825421.95	26721918.35	1718.4	1715.4	230.5	3.0	213.0 - 233.0	4	PVC	Artesian
TR-12	NERT	825286.32	26723272.20	1696.6	1693.4	292.5	3.2	275.2 - 295.2	4	PVC	Artesian

NOTES:

AMPAC = American Pacific Corporation

BRC = Basic Remediation Company

COH = City of Henderson

DTW = depth to water

ft = feet

ft amsl = feet above mean sea level

ft bgs = feet below ground surface

ft btoc = feet below top of casing

NA = not available

NERT = Nevada Environmental Response Trust

PVC = polyvinyl chloride

Sch 80 PVC = Schedule 80 polyvinyl chloride

SS = stainless steel

1. DTW measurements should be taken from the DTW Reference Elevation. The DTW Reference Elevation is equivalent to the top of casing (TOC) elevation, except at the following wells in the Interceptor Well Field (IWF) where the DTW Reference Elevation is higher than the TOC by the distance listed: I-B (0.2 ft), I-C (0.6 ft), I-D (0.4 ft), I-E (0.5 ft), I-G (0.8 ft), I-H (0.7 ft), I-J (1.0 ft), I-K (1.1 ft), I-L (0.4 ft), I-M (0.8 ft), I-N (1.2 ft), I-O (1.3 ft).

TABLE 7: GROUNDWATER MONITORING PROGRAM ROLES AND RESPONSIBILITIES
Nevada Environmental Response Trust Site
Henderson, Nevada

	Data Collection	Data Deliverables	Field Data Verification	Laboratory Data Verification	Laboratory Data Validation	Data Management	Data Evaluation and Reporting	Well Inspection and Maintenance	Corrective Actions
GWETS Operator	• Sampling extraction wells • Providing guidance on well access • Handing samples after collection • Taking custody of Groundwater Sampling Contractor's samples at end of day	• Preparing field documents and EDDs for extraction well sampling	• Communicating deviations from sampling program to Trust and Data Manager					• Notifying Data Manager of well maintenance issues found during sampling • Repairing wells and communicating nature and timing of repairs to other parties	• Correcting errors during sampling • Correcting errors in field deliverables
Groundwater Sampling Contractor	• Sampling monitoring wells • Handling samples after collection	• Preparing field documents and EDDs for monitoring well sampling • Reviewing and correcting field documents and EDDs for all sampling • Submitting field documents and EDDs to Data Manager	• Verifying that field activities follow SAP • Verifying that field documents and EDDs are complete, correct, and CEM approved • Checking consistency between field logs and EDDs • Checking that all required samples and measurements are collected • Communicating deviations from sampling program to the Trust and the Data Manager					• Notifying Data Manager of well maintenance issues found during sampling	• Correcting errors during sampling • Correcting errors in field deliverables
Data Manager			• Contacting Groundwater Sampling Contractor with questions about deliverables	• Verifying all deliverables from Analytical Laboratory have are complete and have undergone data verification	• Coordinating data validation by independent contractor	• Entering all analytical and field data in project database • Maintaining project database • Performing QA/QC on project database • Downloading and tracking data as it is generated • Coordinating with other parties when data issues arise • Corresponding with Trust on data management issues	• Compiling, reviewing, analyzing, presenting, and interpreting groundwater monitoring data • Preparing Annual Performance Reports and Semi-Annual Performance Memoranda • Updating SAP	• Notifying sampling parties of potential well maintenance issues found during data evaluation	• Resolving issues with data validation process • Correcting errors in database
Analytical Laboratory	• Providing sample containers and coolers • Providing courier service to take samples to laboratory • Analyzing samples	• Reporting analytical results in pdf reports, EDDs, and online data portal		• Verifying all analyses are correctly performed • Verifying all laboratory data deliverables are consistent with each other					• Correcting errors in laboratory analyses

Notes:

CEM = Certified Environmental Manager

EDD = electronic data deliverable

SAP = sampling and analysis plan

TABLE 8: SAMPLE PRESERVATION, CONTAINERS, AND HOLD TIMES

Nevada Environmental Response Trust Site

Henderson, Nevada

ANALYTES	MATRIX	ANALYTICAL METHOD	PRESERVATION	CONTAINER[(1)(2)]	TAT	HOLD TIME[(3)]
Volatile Organic Compounds (VOCs)	Water	EPA Method 8260B [(4)]	HCl; Cool to 0 - 6˚C; No headspace	3 x 40 mL VOA vials with Teflon-lined caps	10d	14d
Metals [(5)]	Water	EPA Method 200.7	HNO_3 to pH < 2	500 mL HDPE	10d	180d
Hexavalent Chromium	Water	EPA Method 218.6	Cool to 0 - 6˚C; Unpreserved	500 mL HDPE	10d	24h [(6)]
Inorganic Anions[(7)]	Water	EPA Method 300.0	Cool to 0 - 6˚C	500 mL plastic	10d	48 h[(8)]
Chlorate	Water	EPA Method 300.1	50 mg/L EDA; Cool to 0 - 6˚C	125 mL plastic	10d	28d
Perchlorate	Water	EPA Method 314.0	Cool to 0 - 6˚C; Headspace required	500 mL glass or plastic	10d	28d
Phenols	Water	EPA Method 420.1	H_2SO_4 to pH <2; Cool to ≤ 6 ˚C	1 L glass	10d	28d
Specific Conductance	Water	SM 2510	Cool to 0 - 6˚C	500 mL glass or plastic	10d	28d
Total Dissolved Solids (TDS)	Water	SM 2540C	Cool to 0 - 6˚C	1 L HDPE	10d	7d
Total Organic Carbon (TOC)	Water	SM 5310C	H_3PO_4 to pH < 2; Cool to 0 - 6˚C	250 mL amber glass	10d	28d
Total Organic Halides (Quad)	Water	SM 9020	H_2SO_4 to pH <2; Cool to ≤ 6 ˚C	1 L amber glass	10d	28d

Notes:

EPA = United States Environmental Protection Agency
HDPE = High-Density Polyethylene
SIM = Selective Ion Monitoring
SM = Standard Method
TAT = Turnaround Time

EDA = ethylenediamine
HCl = Hydrochloric Acid
H_2SO_4 = Sulfuric Acid
H_3PO_4 = Phosphoric Acid
HNO_3 = Nitric Acid

d = day(s)
h = hours
mL = milliliters
L = liter

(1) Additional volume will be collected for MS/MSD samples.

(2) Laboratory may provide alternate containers as long as the containers meet the requirements of the method and allow the collection of sufficient volume to perform the analysis.

(3) Hold time begins from date of sample collection.

(4) 1,4-Dioxane and 1,2,3-Trichloropropane will be run by EPA Method 8260B SIM.

(5) Boron, Total Chromium, Iron, Manganese, Sodium

(6) Hold time for Hexavalent Chromium is 24 hours from collection. If the sample is filtered at the time of collection, refrigerated between 0 and 6 °C, and preserved (pH 9.3-9.7) at the time of collection or at the lab within 24 hours of collection, the hold time is 28 days.

(7) Chloride, Sulfate, Nitrate as N

(8) Hold time is 48 hours for Nitrate. Hold time is 28 days for Chloride and Sulfate.

FIGURES

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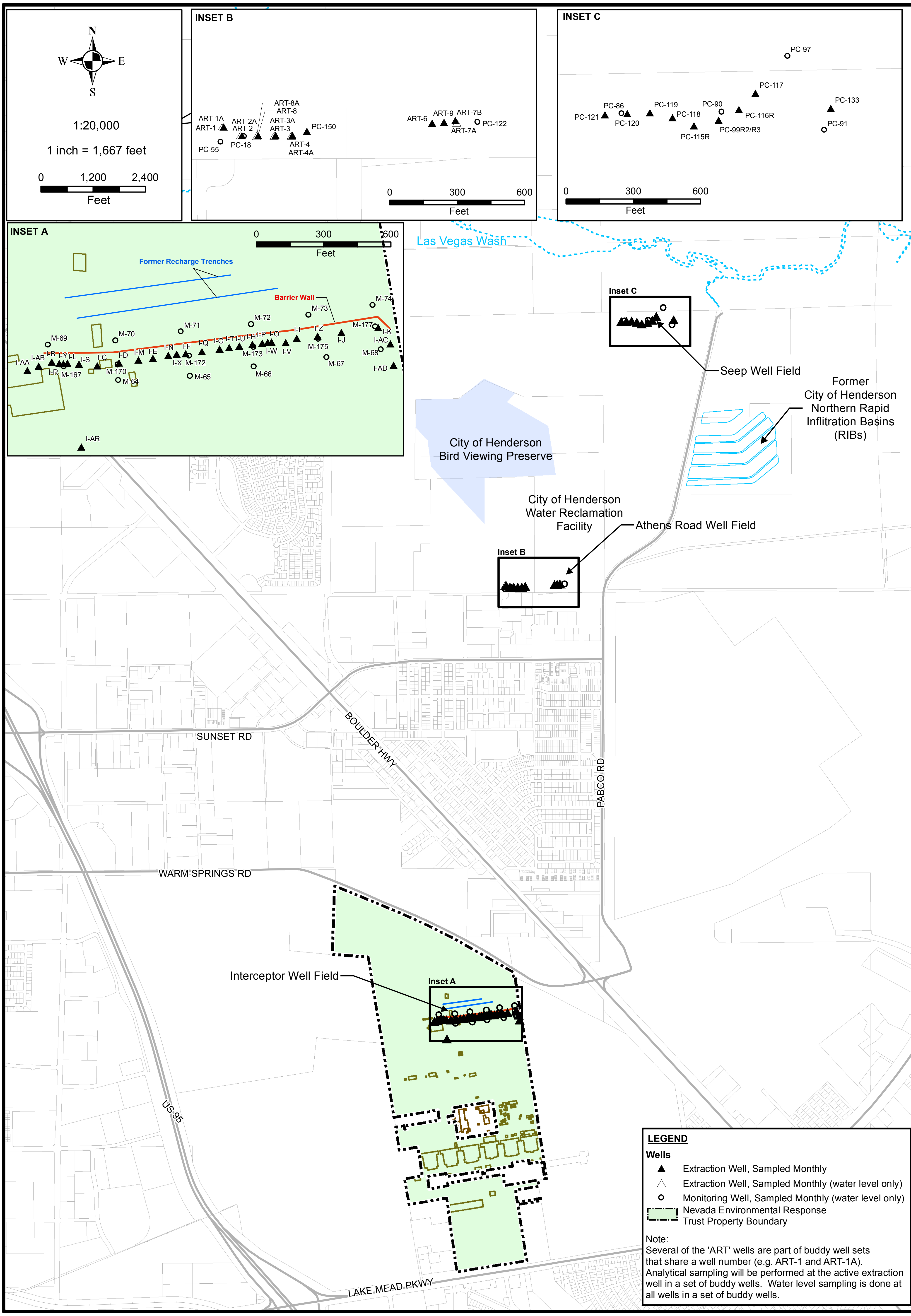

RAMBOLL ENVIRON

DRAFTED BY: RS | DATE: 3/8/2017

GROUNDWATER MONITORING PROGRAM: MONTHLY SAMPLING EVENT

Remedial Performance Groundwater Sampling and Analysis Plan

Nevada Environmental Response Trust Site

Henderson, Nevada

FIGURE

1

21-41400A

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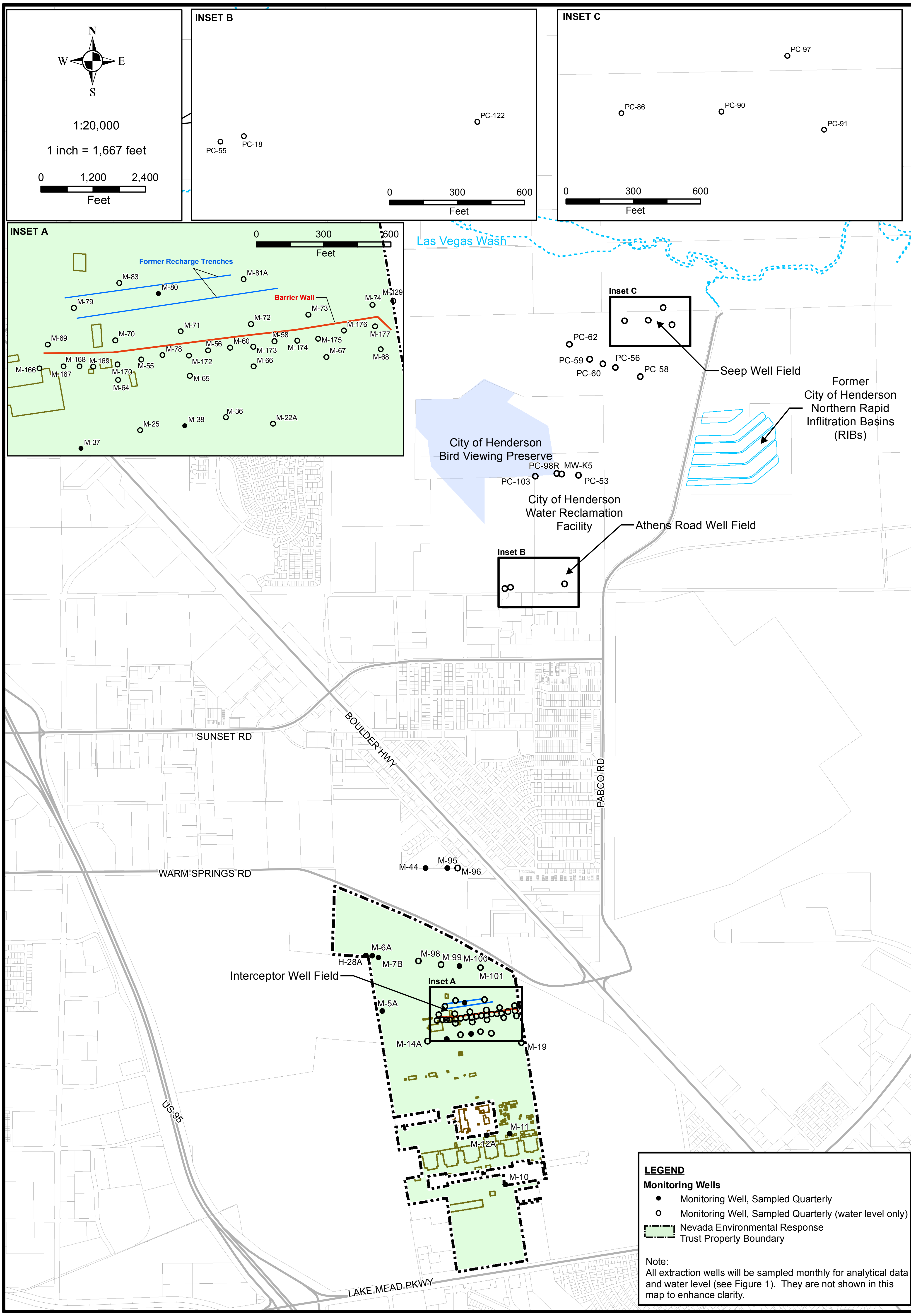

RAMBOLL ENVIRON

DRAFTED BY: RS

DATE: 3/8/2017

GROUNDWATER MONITORING PROGRAM: QUARTERLY SAMPLING EVENT

Remedial Performance Groundwater Sampling and Analysis Plan

Nevada Environmental Response Trust Site

Henderson, Nevada

FIGURE

2

21-41400A

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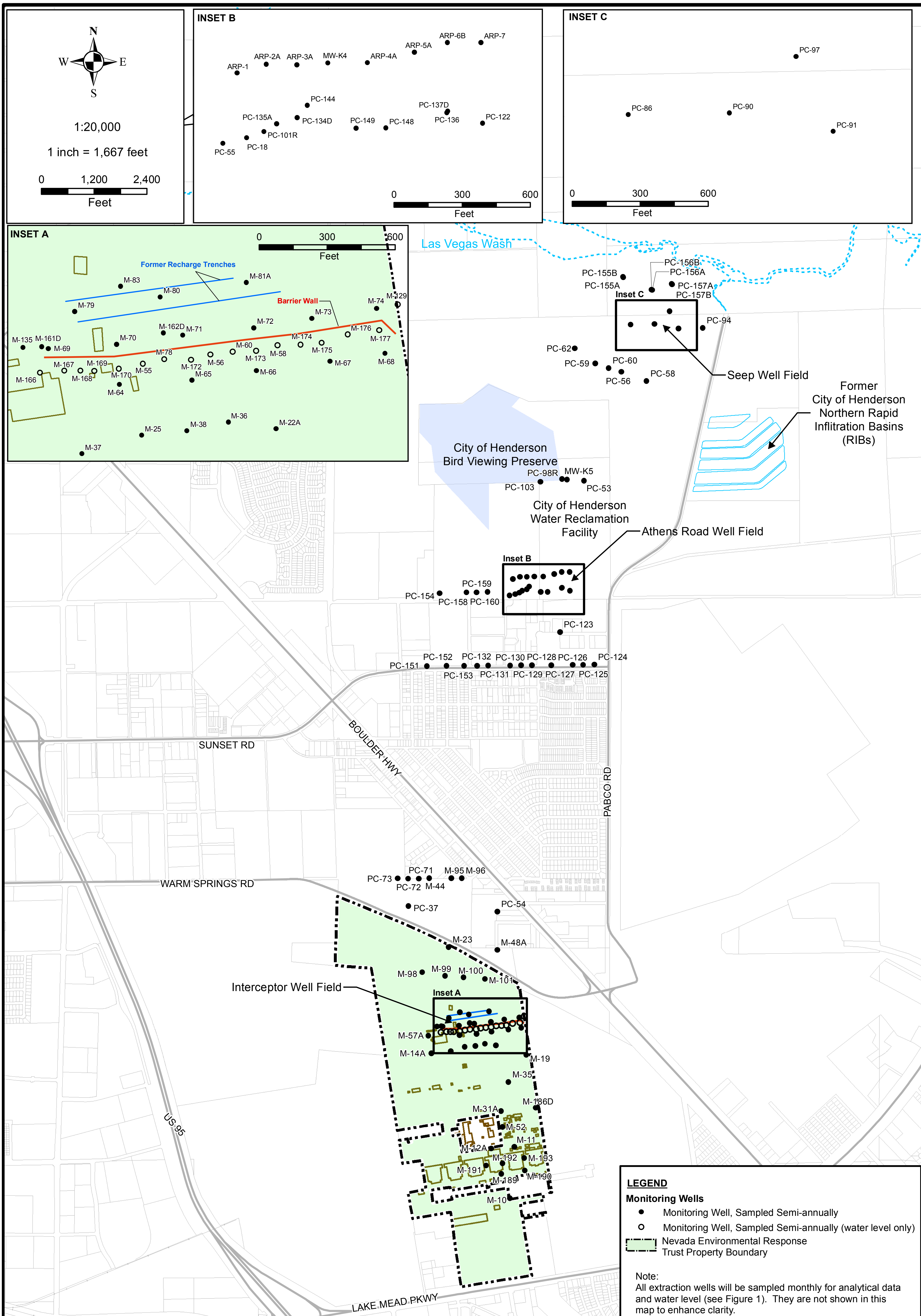

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DRAFTED BY: RS

DATE: 3/8/2017

GROUNDWATER MONITORING PROGRAM: SEMI-ANNUAL SAMPLING EVENT
Remedial Performance Groundwater Sampling and Analysis Plan
Nevada Environmental Response Trust Site
Henderson, Nevada

FIGURE
3

21-41400A

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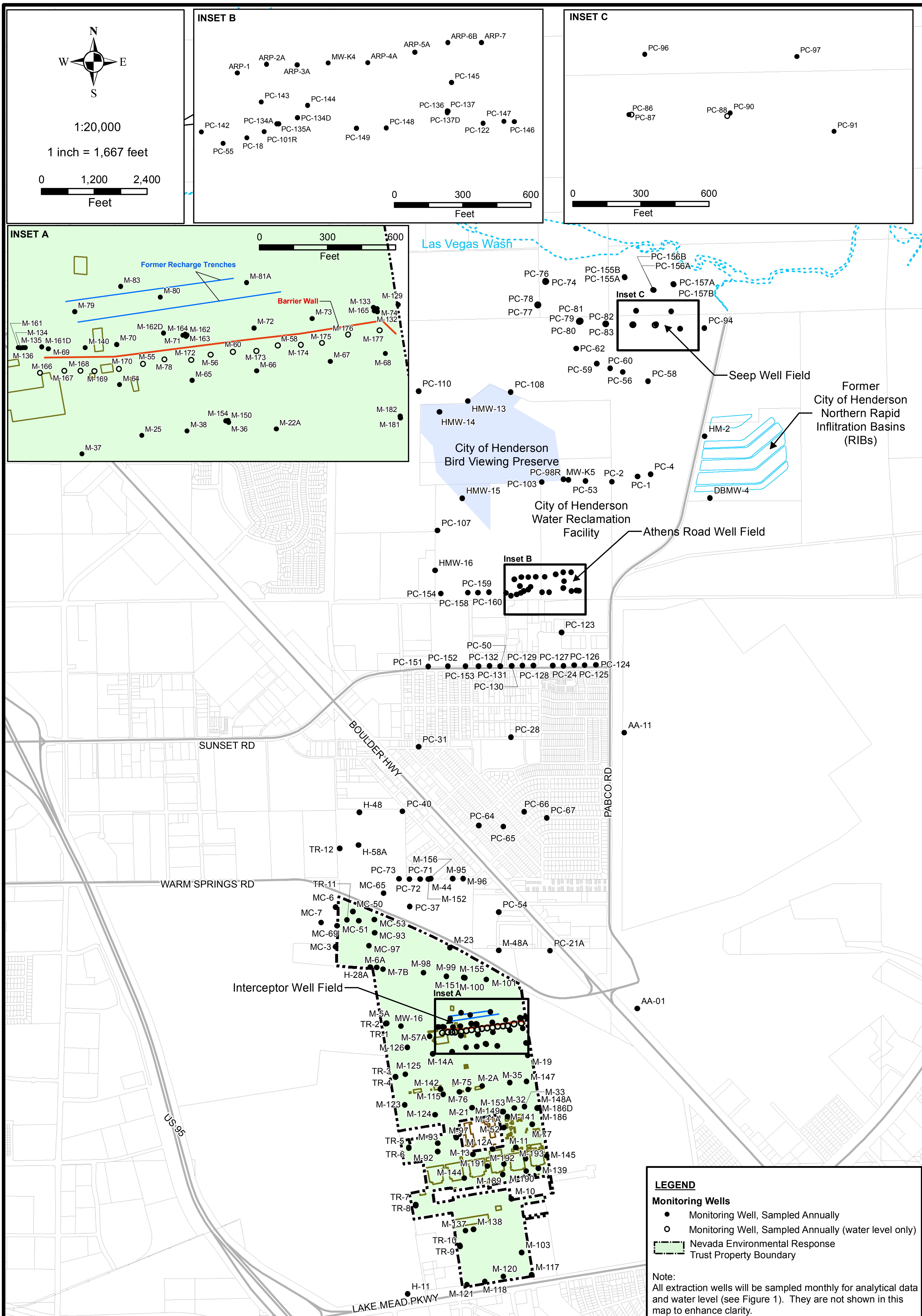

RAMBOLL ENVIRON

DRAFTED BY: RS DATE: 3/8/2017

GROUNDWATER MONITORING PROGRAM: ANNUAL SAMPLING EVENT
Remedial Performance Groundwater Sampling and Analysis Plan
Nevada Environmental Response Trust Site
Henderson, Nevada

FIGURE
4

21-41400A

APPENDIX A
ROLES AND CONTACT INFORMATION

APPENDIX A: ROLES AND CONTACT INFORMATION
Nevada Environmental Response Trust Site
Henderson, Nevada

Project Role	Responsible Company	Contact Person	Contact Information
Site Owner	Nevada Environmental Response Trust	Steve Clough	steve.clough@nert-trust.com, (702) 960-4309
Regulator	Nevada Division of Environmental Protection	Weiquan Dong	wdong@ndep.nv.gov, (702) 486-2850, x252
GWETS Operator	Envirogen Technologies, Inc.	Wendy Prescott	wprescott@envirogen.com, (702) 371-9307
Groundwater Sampling Contractor	Tetra Tech, Inc.	Bounkheana Chhun	bounkheana.chhun@tetratech.com, (303) 448-7406
Data Manager	Ramboll Environ US Corporation	Project Manager: John Pekala	jpekala@ramboll.com, (602) 734-7710
		Quality Control Manager: Chris Ritchie	critchie@ramboll.com, (510) 420-2542
		Database Manager: Craig Knox	cknox@ramboll.com, (510) 420-2518
Analytical Laboratory	TestAmerica Laboratories, Inc.	Rossina Tomova	rossina.tomova@testamericainc.com, (949) 260-3276
Data Validator	Laboratory Data Consultants, Inc.	Stella Cuenco	scuenco@lab-data.com, (760) 827-1140

Note: This table will be updated and reissued as contact information changes.

APPENDIX B

GROUNDWATER MONITORING FIELD GUIDANCE DOCUMENTS (FGDS)

FIELD GUIDANCE DOCUMENT NO. 005

LOW-FLOW GROUNDWATER SAMPLING

RAMBOLL ENVIRON

FIELD GUIDANCE DOCUMENT NO. 005

LOW-FLOW GROUNDWATER SAMPLING

Prepared By:	Elysha Anderson Revision 1: Kate Logan, Emily Gilson, Katie Linscott
Peer Reviewed By:	Dan Clark Chris Ritchie
Approved By:	John M. Pekala
Applicable To:	Nevada Environmental Response Trust Site Henderson, Nevada
Effective Date:	January 24, 2014
Revision Notes:	0 First Issuance 1 Updated from ENVIRON to Ramboll Environ template; updated special advisory for low-yield wells in Section 4.3; updated stabilization criteria, VOA vial filling procedure, decontamination requirements; provided specific examples of sample identification labels; updated responsibilities of field personnel, field team supervisor, and client; revised information to be included on field forms.
Documents Used as Reference During Preparation:	United States Environmental Protection Agency *(USEPA) Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection*, dated 2002. United States Environmental Protection Agency *(USEPA) Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells,* dated January 19, 2010.

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1. INTRODUCTION

This Field Guidance Document (FGD) describes procedures for low-flow groundwater sampling at the Nevada Environmental Response Trust Site. Although this FGD describes procedures for low-flow groundwater sampling for this project, it should be understood that there may be details of this type of work not specifically discussed in this FGD that would be followed by personnel trained in these techniques. To perform this work in a safe and competent manner, personnel involved in field activities should be sure that they are trained in those field activities they are tasked with, and they understand the scope of work and the level of detail necessary for each field activity prior to mobilizing to perform the work.

This FGD is intended as a guidance document and does not supersede Health and Safety procedures or Site-Specific Health and Safety Plan (HASP) requirements. All personnel shall follow the guidelines, rules, and procedures contained in site-specific HASPs prior to adhering to any procedures recommended in this FGD. All field personnel must review and sign the applicable HASP and the completed HASP and relevant project information must be maintained in the project file. Project personnel involved in field activities must also follow the procedures outlined in this and other applicable FGDs as well as any task-specific work plan or sampling plan. It is the responsibility of the field team supervisors to ensure compliance with all of these requirements.

2. EQUIPMENT/MATERIALS

Equipment and materials needed to conform to this FGD are listed below. The use of alternative equipment or materials for any of the items listed below must be approved by the client prior to use. Equipment and materials include:

- Health and Safety Plan
- Site information (maps, contact numbers, etc.)
- Well information (previous water levels, well depths and screen intervals, previous purge logs, etc.)
- Electronic water level meter (Solinst or similar)
- Photoionization Detector (PID) and/or Flame ionization detector (FID) if required by site or project needs
- Adjustable-rate bladder pump capable of rates <500 milliliters per minute (mL/min) (e.g., QED Sample Pro); other pumps may be acceptable, but must be approved by the client prior to use
- Bladders for sample pump
- Pump controller with or without on-board air compressor (If no on-board compressor, have a stand-alone air compressor and/or nitrogen tanks for operating bladder pumps)
- Sample tubing (Teflon® or Teflon®-lined tubing for sampling organic compounds)
- Multi-parameter meter (e.g. YSI 556 Multi-Parameter Meter or equivalent) with flow through cell capable of measuring (at a minimum) temperature, pH, specific electrical conductance (SEC), dissolved oxygen (DO), and oxidation-reduction potential (ORP)
- Turbidity meter
- In-line filters (if required, e.g., for dissolved metals)
- Certified-clean sample containers and preservation supplies, sample labels, Ziploc™ bags
- Cooler with ice
- Decontamination supplies (e.g. phosphate-free detergent, distilled water)
- Tool kit with appropriate tools (socket wrench set, pry bar, Dolphin locks/keys)
- Drum(s) to collect purged water and decontamination water
- Drum labels
- PPE typically will consist of:
  - Long-sleeved shirt and long pants
  - Steel-toed boots
  - Hardhat

  - Nitrile gloves
  - Safety glasses with side shields
  - Other as required by the site-specific Health and Safety Plan
- Field Forms
  - Field Investigation Daily Log
  - Water Level Measurement Log
  - Low-Flow Purging and Sampling Log
  - Equipment Calibration Log
  - Chain of Custody

3. METHODOLOGY

This FGD has been prepared in accordance with the United States Environmental Protection Agency (USEPA) Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection, dated 2002. This guidance document is included as Attachment 3 of the Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. Revision 1 of this FGD includes updates based on the USEPA's Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated January 19, 2010.

Unlike traditional purging methods, low-flow purging and sampling does not require the removal of an arbitrary volume of water from a well prior to sampling. Instead, low-flow purging and sampling relies on careful monitoring of water quality indicator parameters to determine when a representative groundwater sample can be collected. The low-flow methodology minimizes the effects on groundwater chemistry caused by the purging process by minimizing drawdown, reducing the amount of water removed from the well, and reducing the amount of turbidity in groundwater samples.

4. PROCEDURES

The following sections discuss the procedures to follow during low-flow purging and sampling of shallow monitoring wells with dedicated or non-dedicated equipment since both are employed. Where applicable and when possible, the purging and sampling techniques should remain consistent from one sampling event to the next.

Non-dedicated pumps made of inert materials may be used (see Section 2). All non-dedicated pumps must be easily decontaminated in the field. Tubing must be changed between each well. The reuse of tubing dedicated to a single well is encouraged to reduce waste between sampling events.

4.1 Pre-Sampling Activities

To the extent practical, sampling should begin at the well with the least contamination and proceed systematically to the wells with the higher expected concentrations. All measuring devices and monitoring equipment should be calibrated according to the manufacturer's instructions. Water quality meters must be calibrated daily before use. Equipment calibration details should be recorded in the *Equipment Calibration Log*.

Depending on project requirements, the headspace at the top of the wells may be monitored for volatile organic compounds (VOCs) with a PID or FID when well caps are opened for sampling. If VOCs are determined to be present, worker breathing zones should be monitored during purging/sampling and measurements should be recorded on field logs.

The proper procedure is as follows:

1. Unlock well and/or remove well cap. Note that wells may be flush-mount or above-grade completions.
2. Monitor the headspace at the top of the well for VOCs, depending on project requirements.
3. Measure the water level to obtain the static water level (see Section 4.2). Water levels should be measured to the nearest 0.01 foot relative to a well's top of casing (TOC).

4.2 Water Level Measurement

Water levels will be recorded on a Water Level Measurement Log and/or a Water Purging and Sampling Log.

Water levels can be measured by several techniques, but the most common method is using an electronic water level meter (e.g., Solinst). Other methods used at the site may include remote data logging via pressure transducers or from a pressure gauge at the top of artesian wells. Refer to manufacturer's manuals for specific protocols for collecting data from remote water level measuring devices. For artesian wells, readings of pressure in pounds per square inch (psi) are recorded from a pressure gauge at the wellhead.

Water level meters must be decontaminated before initial use and after measurements are made in each well.

The proper sequence for water level measurement is as follows:

1. Turn water level meter on and check that its indicator is working.
2. Record the following information on the *Water Level Measurement Log* or the *Water Purging and Sampling Log*:
   - Well number
   - Top of casing elevation, if available
   - Surface elevation, if available
3. Use caution when opening the well. If pressure has developed inside the well casing, allow the well to stand without a cap for a few minutes until the water level stabilizes before taking a water level measurement. Record observance of positive or negative pressures in the well.
4. Inspect well for abnormalities (e.g., broken locks, damaged casing, blockages, etc.) and note on field logs. If there is dedicated tubing inside the well, it may have to be removed prior to gauging the well to avoid blocking the water level meter.
5. Lower the water level meter cable slowly into the well until the buzzer indicates a closed circuit. Raise and lower the electric cable slightly until the maximum response on the indicator is found. Record the static water level to the nearest hundredth (0.01) foot from the surveyed reference mark or notch on the top edge of the well casing (TOC). If no reference mark is present, the measurement should be taken from the north side of the inner casing.
6. Repeat the measurement as necessary to confirm the level by raising and lowering the probe until the maximum response is observed.
7. Record the time and day of the measurement.
8. Compare measurement against historical measurements to perform a “reality check” of the measurement and recheck water level as needed. Record initial water level measurements and all confirmation measurements on the *Water Level Measurement Log* or the *Water Purging and Sampling Log*. Also note whether the well has been pumped recently, as water levels may require additional time to return to static conditions after pumping has ceased.
9. The probe (or portion of the instrument that was immersed in groundwater) will be cleaned with a solution of laboratory-grade phosphate-free detergent (e.g., Alconox™) and deionized water. The equipment will then be rinsed with deionized water and dried with a clean paper towel. Steam-cleaning is also an acceptable method of decontaminating the probe.

Water level measurements at the site will be taken as quickly as practically possible, to best represent the potentiometric surface across the site at a single time. Care will be taken not to drop foreign objects into the wells and not to allow the monitoring and sampling equipment to touch the ground or any other contaminating surfaces.

4.3 Purging and Sampling

1. If using a dedicated pump, attach sample tubing to the wellhead according to manufacturer's procedures.
2. If there is dedicated tubing in the well, but no dedicated pump, using appropriate PPE, pull the tubing and keep it from kinking or knotting by using a reel or by hand coiling it. Inspect the tubing for damage while removing it from the well and protect the tubing from touching the ground or other contaminated surfaces. If necessary to store the tubing, place in a clean plastic bag. If there is no tubing, or the dedicated tubing needs replacement, use only new tubing.
3. If using a non-dedicated pump, attach the tubing to the pump according to manufacturer's procedures, place the pump and support equipment at the well head and slowly lower the pump and tubing down into the monitoring well until the location of the pump intake is set at a predetermined location within the screen interval. Where possible, pre-measured tubing should be used to place the pump intake at the same depth as previous sampling events, or at a depth where there is known contamination within the screen interval. If there is no previous information for the well, the pump intake should be placed at the middle (or slightly above the middle) of the saturated screen interval. Record the pump depth in the *Low-Flow Purging and Sampling Log*.
4. Measure depth to water to the nearest 0.01 foot relative to the reference measuring point on the TOC with an electronic water level indicator. Record depth to groundwater information in the *Low-Flow Purging and Sampling Log*. Leave water level indicator in the well.
5. Connect the discharge line from the pump to a flow-through cell that at a minimum measures temperature, pH, SEC, DO, and ORP. Turbidity measurements can be made using a separate turbidity meter. The discharge line from the flow-through cell must be directed to a container to hold purge water collected during purging and sampling of the well. Purge water will be collected in a portable tank (e.g., trailer-mounted polyethylene tank) and discharged to the on-site groundwater treatment system at the end of the sampling or when tank is full.
6. Connect the air lines to the flow controller and start pumping the well. Note the time that purging begins on the *Low-Flow Purging and Sampling Log*. If the well has previously been sampled using low-flow techniques, review the prior purge logs if available to determine an appropriate purge rate. For new wells or wells with no purging history, start purging at the lowest flow rate allowed by the pump and slowly increase the flow rate until drawdown begins. Once drawdown is observed reduce the purge rate until a stable water level is maintained. Purge rates are not to exceed 500 mL/min. Check the water level. Maintain a steady flow rate while maintaining a drawdown of less than 0.3 feet. (Zero drawdown is optimal, but may not be achievable). If drawdown is greater than 0.3 feet, lower the flow rate; 0.3 feet is a goal to help guide with the flow rate adjustment. This goal will be difficult to achieve in some wells due to low hydraulic conductivities and limitations to the lowest flow rate a pump can produce while maintaining steady flow. When water levels will not stabilize or when drawdown in excess of 0.3 feet is observed even at minimum flow rates, refer to the Special Advisory at the end of these procedures.

7. Measure the discharge rate of the pump with a graduated cylinder and a stopwatch. Also, measure the water level and record flow rate, total purged volume, and water level on the *Low-Flow Purging and Sampling Log* every three to five minutes. Total purged volume should be measured using a graduated cylinder or calculated based on the recorded purge rate and time interval between measurements. Purging rates should be maintained to ensure minimal drawdown in the monitoring well.

8. Monitor and record the water quality indicator parameters every three to five minutes in the *Low-Flow Purging and Sampling Log*. Stable readings of temperature, pH, SEC, DO, turbidity and ORP indicate when a representative sample can be collected. The stabilization criterion is based on three successive readings of the water quality indicator parameters as shown in Table 1. Turbidity and ORP may not always be appropriate stabilization parameters and will depend on site-specific conditions. However, readings should be recorded because of their value for understanding groundwater conditions. Water level should also continue to be monitored in order to maintain a drawdown of less than 0.3 feet.

TABLE 1: Recommended Stabilization Criteria for Water Quality Indicator Parameters During Low-Flow Purging and Sampling

Parameter	Stabilization Criteria
Temperature	± 3% of reading
pH	± 0.1 pH units
Specific Electrical Conductance (SEC)	± 3% µS/cm
Dissolved Oxygen (DO)	± 10% (when DO is greater than 0.5 mg/L) If 3 consecutive DO readings are less than 0.5 mg/L, consider the values as stabilized.
Turbidity	± 10% NTUs (when turbidity is greater than 10 NTUs) If 3 consecutive turbidity readings are less than 10 NTUs, consider the values as stabilized.
Oxidation-Reduction Potential (ORP)	± 10 millivolts

9. Once stabilization of water quality indicator parameters and drawdown is achieved, and at least one system volume (including the volume of water in the pump and tubing) and the stabilized drawdown volume[1] have been purged from the well following water level stabilization, samples can be collected. Note the time that stabilization is achieved as the stop purge time on the purge log. The sample time, along with any QA/QC sample times, should also be recorded on the *Low-Flow Purging and Sampling Log*. Maintain the same pumping rate or reduce slightly for sampling as necessary in order to minimize

[1] The USEPA's Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated January 19, 2010, defines stabilized drawdown volume as the volume of water between the initial water level and the stabilized water level.

disturbance of the water column. Disconnect the pump's tubing from the flow-through cell so that the samples are collected from the pump's discharge tubing. For samples collected for dissolved gases or VOC analyses, the pump tubing needs to be completely full of groundwater to prevent the groundwater from being aerated as it flows through the tubing. If a bladder pump is used to collect samples for dissolved gases or VOC analyses, the pump should be set so that one pulse will deliver a water volume that is sufficient to fill a 40-mL volatile organic analysis (VOA) vial. Generally, the sequence of the samples is immaterial unless filtered (dissolved) samples are collected. VOC samples are normally collected first, and filtered samples should generally be collected last (see below). All sample containers should be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container. When collecting VOC samples using VOA vials, a meniscus must be formed over the mouth of the VOA vial to eliminate the formation of air bubbles and head space prior to capping. VOA vials should be capped immediately following sample collection to minimize volatilization from the sample. Effervescence and colorimetric reactions should be recorded in the *Low-Flow Purging and Sampling Log.*

10. If a field filtered (dissolved) metal sample is to be collected (or field filtered samples for any other analytes are required), then an inline filter is fitted at the end of the discharge tubing and the sample is collected after the filter. The inline filter must first be flushed in accordance with manufacturer's recommendations and if there are no recommendations for flushing, a minimum of 0.5 to 1.0 liter of groundwater from the monitoring well must pass through the filter prior to sampling. (Note: Groundwater filter cartridges are dedicated sampling equipment. A new cartridge should be used at each sampling location. Do not attempt to clean filter cartridges. If the filter becomes clogged or groundwater flow is too slow, remove and replace with a new filter cartridge.)

11. For non-dedicated systems, remove the pump from the monitoring well. Decontaminate the pump and hang the tubing within the well for the next sampling event. If tubing is damaged or otherwise needs replacing, remove and dispose of the tubing. For dedicated systems, disconnect the tubing that extends from the plate at the wellhead (or cap) and discard after use.

12. Close and lock the well.

Special Advisory: If a stabilized drawdown in the well cannot be maintained at the pump's lowest purge rate, samples may be collected as soon as a minimum of one (1) system volume (including the volume of water in the pump and tubing) has been purged from the well. This information should be noted in *the Low-Flow Purging and Sampling Log*.

4.4 Equipment Decontamination

The electronic water level meter and the water quality meters will be decontaminated by the following procedures:

1. The water level meter will be hand washed with phosphate-free detergent (e.g., Alconox™) and a scrubber, then triple rinsed with distilled water, or steam-cleaned.

2. The water quality meters and flow-through cell (if used) will be rinsed with distilled water between sampling locations. No other decontamination procedures are necessary or recommended for these meters since they are sensitive instruments. After the sampling

event, the flow-through cell and sensors must be cleaned and maintained per the manufacturer's requirements.

Sample tubing will either be replaced or be dedicated to an individual well. Non-dedicated pumps will be decontaminated between monitoring wells and prior to moving off-site. The pump and discharge line (including support cable and electrical wires which were in contact with the groundwater in the well casing) must be decontaminated by the following procedure:

1. The outside of the pump, support cable, and electrical wires must be pressure-sprayed with soapy water, tap water, and distilled water. Use bristle brush to help remove visible dirt and contaminants.
2. In accordance with the pump manufacturer's procedures, dismantle the pump and clean individual parts using cylindrical brushes and phosphate-free detergent (e.g., Alconox™). Double rinse the parts with tap water and then distilled water. Reassemble the pump following manufacturer's procedures and replacing disposable parts (e.g., the bladder and grab plates) with new parts.
3. If free product is encountered or other conditions are expected, additional decontamination steps may be required.
4. Decontamination water will be collected in a portable tank (e.g., trailer-mounted polyethylene tank) and discharged to the on-site groundwater treatment system.

Other decontamination procedures may be proposed, but must be reviewed and approved by the client prior to implementation.

4.5 Quality Control Procedures

All field Quality Control (QC) samples must be prepared the same as primary samples with regard to sample volume, containers, and preservation. The sample handling and chain of custody procedures for the QC samples will be identical to the primary samples. The following are QC samples that may be collected during groundwater sampling:

- A field duplicate is an independent sample collected as close as possible to the same time that the primary sample is collected and from the same source. Field duplicates are used to document sample precision. Field duplicates will be labeled and packaged in the same manner as primary samples. Field duplicates are analyzed for the same suite of parameters as the primary samples. The frequency of analysis of field duplicates is generally one for every 20 primary samples, but may vary depending on project requirements.
- Equipment blanks are obtained by running distilled or deionized water over or through the sample collection equipment after it has been decontaminated, and capturing the water in the appropriate sample containers for analysis. Equipment blanks are analyzed for the same suite of parameters as the primary samples. The frequency of analysis of equipment blanks is generally one for every 20 primary samples, but may vary depending on project requirements.

- Field blanks are used to assess the presence of contaminants arising from field sampling procedures. Field blank samples are obtained by filling a clean sampling container with reagent-grade deionized water. Field blanks are analyzed for the same suite of parameters as the primary samples. Field blanks may or may not be incorporated into a groundwater sampling plan depending on project requirements.
- Trip blanks are sample containers that are used to evaluate sample cross-contamination of VOCs during shipment. For groundwater sampling, trip blanks consist of hydrochloric acid-preserved, analyte-free, deionized water prepared by the laboratory in VOA vials that will be carried to the field, stored with the samples, and returned to the laboratory for VOC analysis. Generally, one trip blank is required to accompany each sample shipping container or cooler that contains samples for VOC analysis; however, this may vary depending on project requirements.

4.6 Sample Handling and Custody

Samples will be collected, handled, and stored in such a manner that they are representative of their original condition and chemical composition. Identification of samples and maintenance of custody are important elements that must also be utilized to ensure samples characterize site conditions. All samples will be properly identified and maintained under chain of custody protocol to protect sample integrity. The following sections discuss the sample handling and custody requirements.

4.6.1 Sample Identification

To maintain consistency, a sample identification convention including unique identifiers for all groundwater and QC samples must be developed and followed throughout the project. The sample identifiers will be entered onto the sample labels, field forms, chain of custody forms, and other records documenting sampling activities. Sample names will include the well name, sample date, and appropriate sample code and number (if applicable). Example sample names are as follows:

TABLE 2: Sample Identification Conventions

Sample Type	Example Sample Name (for well M-95)
Primary Sample	M-95-20161108
Field Duplicate	M-95-20161108-FD1
Field Blank	M-95-20161108-FB1
Equipment Blank	M-95-20161108-EB1
Trip Blank	M-95-20161108-TB1

4.6.2 Sample Labels

A sample label will be affixed to all sample containers sent to the analytical laboratory. Field personnel will complete an identification label for each sample with the following information written in waterproof, permanent ink:

- Client and project number
- Sample location and depth, if relevant
- Unique sample identifier
- Date and time sample collected
- Filtering performed, if any
- Preservative used, if any
- Name or initials of sample collector
- Analyses or analysis code requested

The use of pre-printed sample labels is preferred in order to reduce sample misidentification problems due to transcription errors. Sample labels must be completed and affixed to the sample container in the field at the time of sample collection.

If errors are made on a sample label, corrections will be made by drawing a single line through the error and recording the correct information. Corrections will be dated and initialed.

4.6.3 Containers, Preservation, and Hold Time

Each lot of preservative and sampling containers will be certified as contaminant-free by the supplier. All preserved samples will be clearly identified on the sample label and *Chain of Custody* form. If samples requiring preservation are not preserved, field records will clearly specify the reason for the discrepancy.

Chemical activity continues in the sample until it is either analyzed or preserved. Once the sample has been preserved, the sample may be held for a period of time before analysis. The time from the collection of the sample to the analysis is defined as the hold time. The hold time varies depending on the media being sampled and the analyses being performed. The collection, preservation, and analysis of samples must be conducted to avoid exceeding relevant hold times. If the hold time for a sample is exceeded, the sample should not be analyzed. If a sample is inadvertently analyzed despite having exceeded the hold time, the sample collector should inform the laboratory to not report the results and the sample should be recollected.

4.6.4 Sample Handling and Transport

Proper sample handling techniques are used to ensure the integrity and security of the samples. Samples for field measured parameters will be analyzed immediately in the field and recorded in the appropriate field forms. Samples for laboratory analysis will be transferred immediately to appropriate laboratory supplied containers in accordance with the following sample handling protocols:

- Don clean gloves before touching any sample containers, and take care to avoid direct contact with the sample;
- Samples will be quickly observed for color, appearance, and composition and recorded as necessary;
- The sample container will be labeled before or immediately after sampling;
- Sample containers and liners will be capped with Teflon®-lined caps before being placed in Ziploc™-type plastic bags. The samples will be placed in an ice chest kept at 4 °C for transport to the laboratory.
- All sample lids will stay with the original containers, and will not be mixed.
- Sample bottles will be wrapped in bubble wrap as necessary to minimize the potential for breakage during shipment.
- The *Chain of Custody* form will be placed in a separate plastic bag and taped to the cooler lid or placed inside the cooler. A custody seal will be affixed to the cooler if the samples are to be shipped by commercial carrier. For shipped samples, U.S. Department of Transportation shipping requirements will be followed and the sample shipping receipt will be retained in the project files as part of the permanent *Chain of Custody* document.

4.6.5 Sample Chain of Custody

Sample chain of custody procedures will be used to maintain and document sample integrity during collection, transportation, storage, and analysis. A sample is considered to be under the control of, and in the custody of, the responsible person if the samples are in their physical possession, locked or sealed in a tamper-proof container, or stored in a secure area.

The *Chain of Custody* form provides an accurate written record that traces the possession of individual samples from the time of collection in the field until they are accepted at the analytical laboratory. The *Chain of Custody* form also documents the samples collected and the analyses requested. The sample collector will record the following information on the *Chain of Custody* forms:

- Client and project number
- Name or initials and signature of sample collector
- Name of destination analytical laboratory
- Name and phone number of field team supervisor in case of questions
- Unique sample identifier for each sample
- Date and time of collection for each sample
- Number and type of containers included for each sample
- Analysis or analyses requested for each sample
- Preservatives used, if any, for each sample
- Sample matrix for each sample
- Any filtering performed, if applicable, for each sample

- Signatures of all persons having custody of the samples
- Dates and times of transfers of custody
- Shipping company identification number, if applicable
- Any other pertinent notes, comments, or remarks

Blank spaces on the *Chain of Custody* will be crossed out and initialed by the field sample collector between the last sample listed and the signatures at the bottom of the sheet.

The field sample collector will sign the *Chain of Custody* and will record the time and date at the time of transfer to the laboratory or an intermediate person. A set of signatures is required for each relinquished/received transfer, including internal transfer. The original imprint of the *Chain of Custody* will accompany the sample containers and a duplicate copy will be kept in the project file.

If the samples are to be shipped to the laboratory, the original *Chain of Custody* relinquishing the samples will be sealed inside a plastic bag within the ice chest, and the chest will be sealed with custody tape that has been signed and dated by the last person listed on the *Chain of Custody*. U.S. Department of Transportation shipping requirements will be followed and the sample shipping receipt will be retained in the project files as part of the permanent *Chain of Custody* document. The shipping company (e.g., Federal Express, UPS) will not sign the *Chain of Custody* forms as a receiver; instead the laboratory will sign as a receiver when the samples are received.

5. PRECAUTIONS

Certain precautions should be taken to ensure safety during the implementation of this FGD. It is important to always remain alert and aware of your surroundings. All personnel performing on-site operations with the potential for exposure to hazardous substances or health hazards are required to be 40-hour trained in accordance with Code of Federal Regulations (CFR) 1910.120 and will meet the personnel training requirements in accordance with 29 CFR 1910.120(e).

The laboratory must be certified by the appropriate regulating agency for the analyses to be performed.

The activities described in this FGD require the implementation of a site-specific Health and Safety Plan to inform personnel of the hazards associated with this work and to describe the methods that will be employed to mitigate those hazards. The Health and Safety Plan must be prepared and approved by the field team supervisor and Project Health and Safety Coordinator prior to initiating field work.

6. RECORDKEEPING

Information collected during groundwater sampling may be recorded on individual field forms. A project-specific Field Logbook may replace any of the individual field forms with the exception of the *Chain of Custody* form. All field forms should be reviewed by field personnel and the field team supervisor for completeness. Following review by the field team supervisor, the original field records will be kept in the project file. The following forms may be used to document the field activities:

- Field Investigation Daily Log
- Water Level Measurement Log
- Low-Flow Purging and Sampling Log
- Equipment Calibration Log
- Chain of Custody

The *Field Investigation Daily Log* will be completed for each day of fieldwork containing (at a minimum) the times and descriptions of the work performed, the activities of any subcontractors or visitors on-site, arrival and departure times for all involved, and any other pertinent information. For larger projects, or when otherwise deemed appropriate by the client, this information may alternatively be recorded in a Field Logbook. In these cases, a separate Field Logbook must be used for each project or site.

The *Water Level Measurement Log* will be used to record water level measurements for all wells. The type, serial number, and calibration date for the water level measuring device will be included on this form. Additionally, this form will be used to record general observations of the conditions of the wells, wellheads, well boxes, and/or monuments.

The *Low-Flow Purging and Sampling Log* will be used to record the details of purging and sampling information for each well including the depth of the pump, purge rates, and volume purged from each well. This form will also be used to record all of the measurements of drawdown and water quality indicator parameters used for evaluating stabilization.

The *Equipment Calibration Log* will be used to document the calibration and status of any measuring instruments used in the field (e.g., PID/FID, water level measuring device, water quality meters, etc.). The frequency and method of calibration will depend on the instrument. Any instruments used will be used in accordance with the factory-provided operating and/or service manuals.

Sample names, date/times, analyses to be performed, and other pertinent information will be recorded on the *Chain of Custody* form as a means of identifying and tracking the samples.

FIELD GUIDANCE DOCUMENT NO. 008

GROUNDWATER AND FREE PRODUCT LEVEL MEASUREMENTS

RAMBOLL ENVIRON

FIELD GUIDANCE DOCUMENT NO. 008

GROUNDWATER AND FREE PRODUCT LEVEL MEASUREMENTS

Prepared By:	Elysha Anderson Revision 1: Emily Gilson, Katie Linscott
Peer Reviewed By:	Dan Clark
Approved By:	John M. Pekala
Applicable To:	Nevada Environmental Response Trust Site Henderson, Nevada
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Documents Used as Reference During Preparation:	

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1. INTRODUCTION

This Field Guidance Document (FGD) presents general guidelines for groundwater level measurements (depth to water) and free product level measurements (depth of free product) in groundwater monitoring wells or piezometers at the Nevada Environmental Response Trust Site. Although this FGD describes procedures for groundwater and free product level measurements for this project, it should be understood that there may be details of this type of work not specifically discussed in this FGD that would be followed by personnel trained in these techniques. To ensure that work performed in a complete and safe manner, personnel involved in field activities should be sure that they understand the scope of work and the level of detail necessary for each field activity prior to mobilizing to perform the work.

This FGD is intended as a guidance document and does not supersede Health and Safety procedures or Site-Specific Health and Safety Plan (HASP) requirements. All personnel shall follow the guidelines, rules, and procedures contained in site-specific HASPs prior to adhering to any procedures recommended in this FGD. All field personnel must review and sign the applicable HASP and the completed HASP and relevant project information must be maintained in the project file. Project personnel involved in field activities must also follow the procedures outlined in this and other applicable FGDs as well as any task-specific work plan or sampling plan. It is the responsibility of the field team supervisors to ensure compliance with all of these requirements.

All personnel performing on-site operations with the potential for exposure to hazardous substances or health hazards are required to be 40-hour trained in accordance with Code of Federal Regulations (CFR) 1910.120 and will meet the personnel training requirements in accordance with 29 CFR 1910.120(e).

Groundwater level measurements are collected to determine the depth to groundwater within a well relative to ground surface, top of the well casing, and/or an established elevation datum. Similarly, free product measurements are collected to determine the depth to non-aqueous phase liquid (NAPL) accumulated within a well relative to an established elevation datum. The accumulated thickness of NAPL within a well can be determined if the bottom of the free product can be additionally measured. Properly collected and recorded measurements can be utilized for generation of potentiometric surface maps to establish groundwater flow direction, define horizontal and vertical hydraulic gradients, evaluate variations in groundwater elevations over time, evaluate NAPL mobility or recovery, and other project specific tasks.

2. EQUIPMENT/MATERIALS

Below is a general checklist of equipment that may be needed for typical groundwater level measurement efforts. This checklist only suggests general equipment that may be necessary for a project or task and should not be considered exhaustive.

1. General Water and Free Product Level Measurement Equipment Checklist
   - Electronic water level indicator
   - Electronic oil/water interface probe for wells containing known or suspected NAPL
   - GPS or other locating device
   - Site map showing locations of wells
   - Well construction records and previous water level measurements
2. Project or Task Specific Water and Free Product Level Measurement Equipment Checklist
   - Task-specific work plan or sampling plan
   - Well lock keys
   - Steel tape measure or submersible water level meter for use in measuring total well depth
   - Decontamination supplies/equipment (non-ionic detergent, tub, brushes, etc.)
   - Wash bottles/bucket
   - Trash Bags - used to dispose of gloves and any other non-hazardous waste generated during sampling
   - Appropriate waste container – used to dispose of any Investigation Derived Wastes (IDW) and/or decontamination wastes
   - Socket wrench (manhole bolt sizes vary; most commonly require a 9/16” socket)
   - Water valve gate box key (for older style flush-mounted wells)
   - Pry bar (or other equivalent tool to assist in the removal of the flush mounted well cover or handhole)
   - Syringe (or other equivalent tool such as a turkey baster to assist in removing standing water in flush mounted wells)
   - Extra batteries for the water level meter (usually 9-volt)
3. Miscellaneous Additional Suggested Equipment
   - Extra vehicle keys
   - Metal locator (to find buried/obstructed flush mounted wells)
   - First aid kit
   - Mobile phone
   - Credit card for gas and emergencies

- Road and site maps
- Chemical protective gloves and other personal protective equipment (PPE) as required by the HASP
- Field notebook and field data sheets
- Waterproof pens
- Bolt cutters (to remove rusted padlocks)
- Replacement padlocks
- Camera and extra batteries

3. PROCEDURES

3.1 Pre-Field Work Preparation Guidelines

At a minimum, the following tasks should be completed by the field personnel and field team supervisors prior to mobilization to the site:

- Review and sign the site-specific HASP;
- Coordinate and obtain permission for property access;
- Review project-specific work plan/sampling plan, where applicable;
- Review project-specific Quality Assurance Project Plan (QAPP), where applicable;
- The field personnel and field team supervisors should review and discuss with the proposed activities or work plan/sampling plan;
- Review the standard instruction manual provided by the manufacturer of the specific equipment being used for water level monitoring and field screening;
- Inspect the water level meter(s) for any signs of damage and test for proper operation;
- Identify well locations and any specific order in which measurements are to be collected;
- Obtain copies of recent or historic (i.e., same season) water or free product level data to be able to anticipate the approximate depth of water or free product minimizing unnecessary wetting of the tape and as a check of the measured levels;
- Obtain well construction information, as these can be used to confirm the well identification if not clearly identifiable; and
- Identify wells that are known or suspected to contain NAPL or other free product. An electronic oil/water interface meter must be used in these wells in lieu of an electronic water level indicator.

All significant field activity decisions will be approved by the field team supervisor and the client before the initiation of associated field activities. The work plan/sampling plan will be designed for the collection of quality data that will best answer the questions and meet the goals of the study/monitoring program. The work plan/sampling plan will generally provide for some discretion in the field depending on encountered conditions; however, any significant departure from prescribed field activities should be approved by the client).

Prior to the commencement of the field effort, inspect, test, and/or calibrate equipment that will be used to take field measurements. This should also be performed as necessary throughout the field effort to maintain proper function.

3.2 General Water Level Measurement Guidelines

Water level measurements are generally taken in monitoring wells, piezometers, or boreholes using electronic water level indicators. There are different manufacturers of electronic water level indicators including Solinst, Keck, and Heron. Electronic water level indicators consist of a reel of dual conductor wire embedded within a pre-marked tape, a probe with an insulating gap between the wire attached to the end of the tape, and an indicator on the reel. Generally, tapes are marked every 1/100th of a foot and/or millimeter. When the probe comes into contact with water, the circuit is closed and the indicator signals this contact with an audible buzzer and/or an optical light. The meters usually use 9-volt batteries within the reel as a power source. Many water level meters include a sensitivity adjustment on the indicator. The sensitivity adjustment diminishes potential short circuiting of the probe in moist environments such as those encountered in a well.

The following provides a recommended list of practices for water and/or free product level measurement activities:

- Where applicable, contact the identified key site personnel upon arrival and assess proposed work areas.
- Because groundwater or free product depth can vary due to natural fluctuations, all measurements for a specific sampling event should be collected within as short of a time frame as possible.
- Although equipment will be decontaminated between uses, to further limit potential cross-contamination between wells, perform measurements from least to most contaminated locations.
- Complete depth to water or free product measurements prior to any planned withdrawals, sampling or disturbance of groundwater unless otherwise specified in the work plan/sampling plan.
- All water or free product level measurements should be made relative to an established reference datum and should be recorded in the field notes. The reference datum is usually marked, notched or etched on the well or casing at the time of installation on the north side of the inner casing. For extraction wells, the reference datum may either be the top of well casing or a defined access point through which the water level meter may be lowered. In the absence of a marked, notched or etched reference datum take water level and depth measurements from the north side of the inner casing and mark or etch it for future reference. In the case of a casing notched or etched at a distinct angle, the measurements should be made from the highest point in the casing. Note this procedure in the field book or on field forms.
- Record in the field book or on field forms the model name, number, and serial number of the electronic water level meter or interface probe being used.
- Identify the well to be measured and confirm by checking for proper identification markings on the well, comparing to a site map, and if needed historical water and/or product level measurements and well construction records. If the well cannot be positively identified, contact the client before proceeding.
- Decontaminate the water level meter probe, interface probe, and/or tape (if total well depth measurements are being conducted with a tape) prior to each use, as described below.
- Remove well cover or equivalent protective casing cover. Inspect the interior of the well box for insects, etc., that could present a biological hazard. If there is water in the well box, remove all water (at least to a level below the top of the inner well casing) prior to

removing the well cap or plug. Indicate that water was removed from the well box and identify possible causes (e.g., missing bolts, damaged well cover, etc.).

- Remove the well cap or plug, noting well identification, time of day, and date in field book or on field form. Also note any abnormal conditions in the well (e.g., damaged inner casing, limited clearance between the bottom of the well box and the top of the inner well casing, absence of reference datum, etc.) If the top of the well casing has been damaged, the reference datum may no longer be accurate.
- If the wells are outfitted with expansion caps, these should be removed and the wells allowed to equilibrate for an appropriate period of time prior to the collection of water level measurements. This is especially critical for wells screened below the water table or in confined units. There are no set guidelines and appropriate equilibration times can range from minutes to hours depending on well recharge, local geology and topography, and project objectives.
- Record observance of positive or negative pressure in the well upon removal of the well cap. The presence of pressure/vacuum in the well could be qualitatively assessed during loosening and removal of an expansion cap (resulting in air either being audibly pushed out or drawn in to the well casing) or using a piece of paper or other light object (i.e., easily moved or displaced by light air flow) placed immediately above the inner well casing and observing its movement (i.e., if it adheres to well casing, there is a negative pressure in the well; if it moves from the well casing, there is a positive pressure in the well). If pressure was observed, the water level should be measured multiple times over a 5 to 10 minute period to allow time for equilibration and confirm that the water level has reached static conditions. Record initial water level measurements and all confirmation measurements on the appropriate field forms. Also note whether the well is under pumping influence, has been pumped recently, or represents static water level conditions. Water levels may require additional time to return to static conditions after pumping.
- Monitor the headspace of the well with a field screening device in accordance with the applicable manufacturer instructions and FGD. Record field screening readings in field book or on field form. The necessity and methodology to conduct field screening should be detailed in the site-specific HASP, sampling plan or Work Plan.
- Check that the indicator is working properly by pushing the test button on the reel. Replace batteries in the electronic water level meter or product interface probe if testing or operation indicates the battery is not providing sufficient power. If the battery is replaced during a field measurement event this must be recorded in a field log book or on a field form.
- Lower the probe slowly into the well taking care to minimize contact with the well casing. If significant kinks are observed in the tape, attempt to straighten manually and record observations in project field book or field form.
- When a strong and steady signal from the indicator signals water or free product has been encountered slowly pull the tape up until the signal ceases.
- Manually lower and raise the probe to exactly locate the water or free product interface.

- At the point where the signal indicates free water or free product has been encountered, measure and record the depth of the probe from the established reference datum using the marked tape.
- If free product is encountered, continue to manually lower the probe into the well until a strong and steady signal from the indicator signals that water has been encountered. Lower and raise the probe to exactly locate the water or free product interface. Measure and record the depth of the probe from the identified reference datum using the marked tape.
- Repeat the measurement to verify accuracy. Measurement should be recorded to the nearest 0.01 feet. If the measurement differs from the previous measurement by more than 2.00 feet, repeat the measurement as further described in Section 3.5.
- Withdraw the probe from the well, replace the well cap, and re-secure the well.
- Total well depth measurements should be made in reference to the top of casing. Generally, total well depth should be measured each time water levels are measured. These measurements should be performed after sampling and measurements should be recorded on field forms.
- Record in the field book or on field form any abnormal conditions within the well (e.g., evidence of blockage, root growth into the well casing, separated casing sections, etc.). Inform the client so necessary maintenance, redevelopment, or repairs are conducted before the next planned water level measurement event.
- To minimize potential cross-contamination of samples among stations, decontaminate the probe and portions of the tape that made contact with water, product, or well materials as described in Section 3.4.

3.3 Procedures for Wells Equipped with Pressure Transducers

Monitoring wells may be equipped with pressure transducers that automatically measure and record pressures at pre-programmed time intervals. Using a reference, these pressures can be converted to DTW. Two types of pressure transducers may be encountered in wells during the course of DTW measurements.

- Standalone pressure transducers suspended from strings/wires or direct-read cables (In-Situ Rugged TROLL 100 or similar)
- Telemetric data loggers comprised of a multi-parameter instrument (In-Situ Aqua TROLL 200) paired with a cellular network telemetry system (In-Situ Tube 300R) with on-board barometer. The data logger sits below the water level of the well and measures temperature, conductivity, absolute water pressure, and water level. In addition, the data logger calculates and reports specific conductivity, salinity, total dissolved solids, resistivity, and water density. These data are automatically transmitted via cellular network.

Data can be downloaded manually from transducers deployed on wire/strings by pulling the transducers to the surface and connecting to the transducer directly. When a transducer is deployed on a direct-read cable, the data can be downloaded without pulling the transducer out of the well. Data are downloaded to field laptops by connecting to the transducers with proprietary cables and software. Transducers equipped with telemetry tubes automatically transmit data to a file transfer protocol (FTP) site every 6-12 hours, and therefore, do not require field personnel to download data.

In order to be prepared with the proper software and connector cables, field personnel should know in advance which wells are equipped with transducers, what make and model of transducer is in use, and how the transducer is deployed. For standalone transducers the following general procedures should be used:

1. Open the well and connect to the direct-read cable at the top of the well (if equipped) using the manufacturer's direct-read adaptor cable. If transducer is deployed on a wire/string, pull the transducer to the surface and connect to transducer via the transducer manufacturer's adaptor cable. If pulling the transducer from the well, use proper PPE as the transducer and wire/string will be wet, coil the string to avoid tangling, and use plastic sheeting or a bucket to contain dripping water.

2. Turn on laptop and launch transducer manufacturer's software.

3. Follow software instructions to download data to laptop.

4. While data downloads, collect a manual water level measurement from the well using the procedures in section 3.2.

5. When data file downloads are complete, open files on laptop and review for completeness.

6. Delete all data from the transducer and re-program it if necessary.

7. Record the transducer's remaining battery life.

8. Re-start logging.

9. Disconnect the laptop from the transducer. Inspect wire/string for damage and replace if necessary. Redeploy transducers on wires/strings to the same depth as initially deployed and record this depth in the field form.

10. Close and lock well.

Although telemetric data loggers do not require field personnel to download data, they may need to be removed from wells in order to perform low-flow sampling. The telemetry tube sits inside the well casing several inches below the top of casing. A black connector cable runs from the bottom of the telemetry tube to the top of the data logger. The connector cable may be coiled to ensure that the data logger is suspended at an appropriate depth. To remove telemetric data loggers for sampling, use the following procedures.

1. Open the well lid and confirm that the transducer and tube, if present, are supported by a bolt that hangs horizontally across the well casing.

2. Holding onto the bolt, pull the telemetry tube up out of the well casing. Once the tube is out of the well, a cable that allows the transducer to hang down into the well will be visible. Pull on the cable until the transducer comes up out of the well casing. Care should be taken not to adjust any zip ties, tape, or coils in the cable. In shallow wells, long narrow coils in the cables allow the transducers to hang at reasonable depths. These coils were constructed carefully so that the cables fit inside 2-inch well casings. It is imperative that the cable lengths and coil structures do not change so that the effective cable lengths and the transducer deployment depths remain constant.

3. Once removed from the well, the tube, cable, and transducer should be placed in or on top of a large trash bag. The devices will continue to run while outside of the well.

4. Record the time of transducer removal on the field form.

5. Proceed to sample the well according to the guidelines in the low-flow sampling FGD.

6. After sampling and before redeploying the transducer, take a manual DTW measurement and record it on the field form.

7. The equipment should be redeployed by lowering the transducer into the well while holding onto the cable and then the bolt. Take care not to adjust the coils in the connector cable. Once the connector cable and telemetry tube, if present, are replaced in the well, the bolt should be positioned to rest securely across the top of casing.

8. When finished record the time of transducer redeployment on the low-flow purge log.

3.4 Equipment Decontamination

Non-dedicated equipment should be decontaminated before and after each use. Decontamination procedures will depend upon the type of contaminants to be encountered and the specific type of equipment used. In general, any portion of the water level meter or interface probe that was submerged should be decontaminated using a non-phosphate detergent (e.g., Alconox) wash, followed by a tap water rinse and final, distilled water rinse.

Interface probes will only be used to measure water levels and NAPL thickness in wells with known or suspected presence of NAPL. To the extent practicable, interface probes should be dedicated to each investigation area. Waste water from the decontamination procedure will be containerized and properly disposed. Equipment used in wells with organic contaminants may require additional cleaning steps.

Cleaning solutions including soaps and deionized water may be sprayed onto equipment or put in tubs used for washing equipment, depending on the amount of the meter or probe that was submerged in a well. Personnel performing decontamination procedures should use appropriate PPE (e.g. gloves). Clean PPE should be used to handle cleaned equipment.

3.5 QA / QC

Quality Assurance/Quality Control (QA/QC) procedures described in the project-specific Work Plan/sampling plan and/or QAPP must be followed throughout the water level measurement process. In addition, the following QA/QC procedures should be performed:

- Calibration of instruments is to be performed per the manufacturer's operating instructions. Deviations from these procedures must be approved by the client prior to data collection.

- Water level measurements at a single well should, at a minimum, be performed with instruments similar to those used during previous monitoring events to aid in data consistency. When possible the same instrument should be used during consecutive events as long as it remains in good operating order and is properly calibrated.

- Compare measurement data to previous measurements obtained at the well. For water level variations from previous measurements greater than 2.00 feet, NAPL thickness variations greater than 10 percent, well depth greater than 0.1 foot, or for data that cannot be explained by trends, repeat the measurements. Additional measurements should be recorded on the appropriate field forms. When repeat measurements at a given well do not match, a reason for the discrepancy should be established and noted, and necessary actions should be taken to address the issue (e.g. acquiring a new instrument, cleaning the probe, etc.).

- Whenever a transducer is installed or removed, or when transducer data is downloaded, a manual water level measurement should also be collected to verify the transducer data. If transducers have to be pulled from the well for any reason, redeploy transducers at the same initial depth.

4. PRECAUTIONS

Certain precautions should be taken to ensure safety during the implementation of this FGD. It is important to always remain alert and aware of your surroundings. All personnel performing on-site operations with the potential for exposure to hazardous substances or health hazards are required to be 40-hour trained in accordance with Code of Federal Regulations (CFR) 1910.120 and will meet the personnel training requirements in accordance with 29 CFR 1910.120(e).

The activities described in this FGD require the implementation of a site-specific Health and Safety Plan to inform personnel of the hazards associated with this work and to describe the methods that will be employed to mitigate those hazards. The Health and Safety Plan must be prepared and approved by the field team supervisor and Project Health and Safety Coordinator prior to initiating field work.

Additional precautions regarding methods for groundwater and free product level measurement are described below:

- Operate electronic water level meters and product interface probes in accordance with the manufacturer's instructions and recommendations.
- The protective casing of flush-mount wells often fills with run-off surface water. If upon removing the well cover, the top of inner well casing is submerged, utilize a syringe, turkey baster, or equivalent tool to remove the excess water before removing the well cap in order to avoid surface water flow into the well.
- Provided well keys may not work with rusted/outdated well locks; bolt cutters may be used to remove the lock, which should be replaced upon completion of water level measurement. Do not use petroleum based solvent sprays to free seized locks as this may impact water quality in the well.
- Wells with a water-tight cap may experience a buildup of pressure, especially if they are screened below the static water level. Keep your face and body from the top of the well when loosening or removing the cap.
- Ensure that the water level has reached the static level prior to recording the depth to water. Should the water level be in a state of flux due to pressure buildup, allow ample time for the water level to stabilize to static conditions before recording measurement.
- Indicator response may be indicative of potential faults that could be corrected in the field:
  - If the signal from the indicator is intermittent or weak it may be necessary to decrease the sensitivity since it may be short circuiting prior to encountering free water.
  - If there is no signal it may be necessary to increase the sensitivity since some water is less conductive and may not complete the circuit.
  - If the signal is still intermittent, weak, or absent then replace the battery and reattempt the measurement.

- Cascading water may interfere with the measurement of free water; particularly in boreholes or rock wells.
- Some well casings have sharp edges; care should be taken when lowering or withdrawing the tape to avoid damaging the tape of the water level meter.
- Oil or other product floating on the water column may insulate the contacts of the probe resulting in a misleading indication of the depth to free water. An oil/water level indicator should be used if there is known or suspected product in a well.
- It should be noted that some water level indicators will have a 2 to 3 inch weight on the tip of the probe which can displace water in a well before the water indicator detects it. These models also make it difficult to detect small amounts of water in wells, i.e. less than 3 inches. If this is expected to be a potential issue, then request a model with the water indicator located on the tip of the probe.
- Meters should be inspected periodically to ensure accurate readings. Electronic water level meters and interface probes may not function properly if the electric wire is broken, cut, or if insulation is removed exposing the wire (resulting in short circuiting). Repaired meters may have had sections of the tape removed and/or spliced and may not meet data quality objectives. Damaged tapes or tapes suspected of being damaged should be repaired by the manufacturer or replaced.
- If using the water level meter for total depth measurements, confirm that the probe is designed for total immersion and the maximum acceptable depth of immersion.
- Tape lengths can be confirmed using a calibrated steel tape periodically or as necessary to adhere to data quality objectives. Discrepancies in tape length must be noted in the field log book and/or field form.
- For high conductivity water (brine), decreasing the sensitivity control prevents bridging so a moist probe is not detected as being in water.

5. RECORDKEEPING

Information collected during groundwater and free product level measurements may be recorded on individual field forms. If the project requires it, a project-specific field logbook may replace any of the individual field forms. Following review by the field team supervisor, the original field records will be kept in the project file. The following forms may be used to document the field activities:

- Field Investigation Daily Log
- Water Level Measurement Log

A *Field Investigation Daily Log* will be completed for each day of fieldwork containing (at a minimum) the times and descriptions of the work performed, the activities of any subcontractors or visitors on-site, arrival and departure times for all involved, and any other pertinent information. For larger projects, or when otherwise deemed appropriate by the client, this information may alternatively be recorded in a field logbook. In these cases, a separate field logbook must be used for each project or site.

The *Water Level Measurement Log* will be used to record the monitoring well name, date and time of measurement, total depth of well, depth to water, measuring point, presence of product, product thickness, and notes about the condition of the well.

FIELD GUIDANCE DOCUMENT NO. 012

ARTESIAN WELL GROUNDWATER SAMPLING

RAMBOLL ENVIRON

FIELD GUIDANCE DOCUMENT NO. 012

ARTESIAN WELL GROUNDWATER SAMPLING

Prepared By:	Thomas Winger
Peer Reviewed By:	Chris Ritchie
Approved By:	John M. Pekala
Applicable To:	Nevada Environmental Response Trust Site Henderson, Nevada
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1. INTRODUCTION

This Field Guidance Document (FGD) describes procedures for sampling artesian groundwater wells at the Nevada Environmental Response Trust Site. Although this FGD describes procedures for sampling artesian wells for this project, it should be understood that there may be details of this type of work not specifically discussed in this FGD that would be followed by personnel trained in these techniques. To perform this work in a safe and competent manner, personnel involved in field activities should be sure that they are trained in those field activities they are tasked with, and they understand the scope of work and the level of detail necessary for each field activity prior to mobilizing to perform the work.

This FGD is intended as a guidance document and does not supersede Health and Safety procedures or Site-Specific Health and Safety Plan (HASP) requirements. All personnel shall follow the guidelines, rules, and procedures contained in site-specific HASPs prior to adhering to any procedures recommended in this FGD. All field personnel must review and sign the applicable HASP and the completed HASP and relevant project information must be maintained in the project file. Project personnel involved in field activities must also follow the procedures outlined in this and other applicable FGDs as well as any task-specific work plan or sampling plan. It is the responsibility of the field team supervisors to ensure compliance with all of these requirements.

2. EQUIPMENT/MATERIALS

Equipment and materials needed to conform to this FGD are listed below. The use of alternative equipment or materials for any of the items listed below must be approved by the client prior to use. Equipment and materials include:

- Health and Safety Plan
- Site information (maps, contact numbers, etc.)
- Well information (previous water levels, previous surface flow rates, well depths and screen intervals, previous purge logs, etc.)
- Electronic water level meter (Solinst or similar)
- Photoionization Detector (PID) and/or Flame ionization detector (FID) if required by site or project needs
- Sample tubing (Teflon® or Teflon®-lined tubing for sampling organic compounds) and fittings to use with existing dedicated pump and well-head equipment
- Volumetric flow calculation container (graduated cylinder, 5-gallon bucket) and surface spill containment (Visqueen, 5-gallon buckets, 55-gallon drum or similar)
- Adjustable-rate sampling bladder pump capable of rates <500 milliliters per minute (mL/min) (e.g., QED Sample Pro) if well does not already have a dedicated pump; other pumps may be acceptable, but must be approved by the client prior to use
- Bladders and tubing (Teflon® or Teflon®-lined tubing for sampling organic compounds) for sample pump if well does not already have a dedicated pump
- Pump controller with or without on-board air compressor (If no on-board compressor, have a stand-alone air compressor and/or nitrogen tanks for operating bladder pumps)
- Multi-parameter meter (e.g. YSI 556 Multi-Parameter Meter or equivalent) with flow through cell capable of measuring (at a minimum) temperature, pH, specific electrical conductance (SEC), dissolved oxygen (DO), and oxidation-reduction potential (ORP)
- Turbidity meter
- In-line filters (if required, e.g., for dissolved metals)
- Certified-clean sample containers and preservation supplies, sample labels, Ziploc™ bags
- Cooler with ice
- Decontamination supplies (e.g. phosphate-free detergent, distilled water)
- Tool kit with appropriate tools (socket wrench set, pry bar, Dolphin locks/keys)
- Drum(s) to collect purged water and decontamination water
- Drum labels
- PPE typically will consist of:

  - Long-sleeved shirt and long pants
  - Steel-toed boots
  - Hardhat
  - Nitrile gloves
  - Safety glasses with side shields
  - Other as required by the site-specific Health and Safety Plan
- Field Forms
  - Field Investigation Daily Log
  - Water Level Measurement Log
  - Low-Flow Purging and Sampling Log
  - Equipment Calibration Log
  - Chain of Custody

3. METHODOLOGY

In artesian wells, water rises within the well to a point above the top of the water-bearing formation. If the water also rises above the ground surface, the well is called a "flowing well," or "flowing artesian well." All flowing wells are artesian, but not all artesian wells are flowing wells.

A flowing artesian well will exhibit flow of groundwater at the surface if not capped, and a measurable pressure ("artesian head") when capped at the surface. Because of this, artesian wells can be sampled without the use of a pump; however, flow rates may be so low that, for practical purposes, a pump is used to collect a sample. Similar to low-flow purging and sampling, the procedure for sampling a flowing artesian well relies on careful monitoring of water quality indicator parameters to determine when a representative groundwater sample can be collected.

This FGD has been prepared in general accordance, where applicable, with the United States Environmental Protection Agency (USEPA) Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection, dated 2002. This guidance document is included as Attachment 3 of the Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers.

4. PROCEDURES

The following sections discuss the procedures to follow during the sampling of an artesian well with dedicated equipment, such as a dedicated pump, wellhead pressure gauge or manometer, and discharge line. Where applicable and when possible, the purging and sampling techniques should remain consistent from one sampling event to the next.

With pre-authorization from the client, non-dedicated pumps made of inert materials may be used with additional considerations if dedicated equipment is not installed (see Section 4.4). To prevent cross-contamination, all non-dedicated pumps must be easily decontaminated in the field. Tubing must be changed between each well. The reuse of tubing dedicated to a single well is encouraged to reduce waste between sampling events.

4.1 Pre-Sampling Activities

To the extent practical, sampling should begin at the well with the least contamination and proceed systematically to the wells with the higher expected concentrations unless only dedicated equipment is being used. All measuring devices and monitoring equipment should be calibrated according to the manufacturer's instructions. Water quality meters must be calibrated daily before use. Wellhead pressure gauges should be checked prior to each sampling event. Equipment calibration details should be recorded in the *Equipment Calibration Log*.

Spill containment consisting of visqueen wrap and 5-gallon buckets or 55-gallon drums will be positioned around the well prior to any sampling activities. If the well completion is compromised, as evidenced by groundwater flow out of the well casing or monument, or the pooling of water near the well location, additional considerations can be taken to minimize release of groundwater to the surface.

4.2 Water Level Measurement

Water level measurement of a flowing artesian well must be collected by either using an installed wellhead pressure gauge, which measures the pressure at the top of casing (TOC), or a standpipe extension connected to the wellhead in a vertical orientation, allowing the water column to rise until reaching equilibrium.

Some important definitions to remember are:

- "Piezometric level" - the level to which water in a confined aquifer will rise within a well. It is the same as the static water level, except that in a flowing well, the piezometric level is above the ground surface. It is not possible to look at the volume of an artesian well discharge and determine what the piezometric level will be. The piezometric level is expressed in feet above ground surface.
- "Artesian head" – the hydraulic pressure created within the confined aquifer that drives the water upward in a well to the piezometric level. The distance from the ground surface to the piezometric level, converted into equivalent pressure (expressed as pounds per square inch, or PSI), is the artesian head.

Finding the piezometric level and artesian head can be done using either of the following means:

1. Extend the well casing, or a smaller diameter pipe through a well seal on the top of the casing, high enough above the ground surface until water no longer flows out the top (without pumping), The distance from the piezometric level within the casing, to the ground surface, converted from feet to pressure, is the artesian head of the aquifer. For example, a piezometric level of 30 feet is converted to artesian head by dividing 30 feet by 2.31 feet/psi. The result is 13 psi of artesian head.
2. A pressure gauge installed on a well seal at the top of the casing can be used to find the piezometric level and artesian head. Multiply the pressure reading on the gauge (in PSI) by 2.31 feet/psi to find the piezometric level. The pressure gauge reading is the artesian head at the gauge elevation.

Method 1 is less practical in most cases and the use of pressure gauges following method 2 is recommended.

The proper sequence for water level measurement is as follows:

1. Record the following information on the *Water Level Measurement Log* or the *Water Purging and Sampling Log*:
    - Well number
    - Top of casing elevation, if available
    - Surface elevation, if available
    - Surface flow, if any
2. Use caution when handling the well. The well head and piezometer are under constant pressure from the flowing aquifer.
3. Inspect well for abnormalities (e.g., broken locks, damaged casing, leaking, wet ground around well not attributable to other sources, blockages, etc.) and note on field logs.
4. Begin recording pressure readings at the wellhead, noting the time. Continue recording measurements once every 30 seconds for 5 minutes. The piezometer readings should be consistent during this period. Record the date and time for each measurement.
5. Compare measurement against historical measurements to perform a “reality check” of the measurement and recheck water level as needed. Also note whether the well has been pumped recently, as water levels may require additional time to return to static conditions after pumping has ceased.

4.3 Purging and Sampling with a Dedicated Pump

1. The well should have a dedicated pump, installed in the screened interval and connected to a discharge port at the wellhead. The well will also have a separate discharge port, not connected to the dedicated pump, to allow gauging of flow rate from the formation. Identify any requirements to operate the dedicated pump (power supply, open valves) and connect sample tubing to the discharge port. Prepare for containment for purge water. **If a dedicated pump is not installed, contact the field team supervisor for authorization before proceeding.**

2. Connect the sample tubing from the discharge port to a flow-through cell that at a minimum measures temperature, pH, SEC, DO, and ORP. Turbidity measurements can be made using a separate turbidity meter. The discharge line from the flow-through cell must be directed into a container to hold purge water collected during purging and sampling of the well. Purge water will be collected in a portable tank (e.g., trailer-mounted polyethylene tank) and discharged to the on-site groundwater treatment system at the end of the sampling or when tank is full.
3. Measure pressure head at the top of casing. Record pressure head and groundwater elevation information in the *Low-Flow Purging and Sampling Log*.
4. Using a 5-gallon bucket with marked denominations, or similar, open the discharge port not connected to the bladder pump and calculate the flow rate of the flowing artesian well. Record the natural flow rate in the *Low-Flow Purging and Sampling Log.* Once an accurate flow rate measurement has been recorded, close the discharge port.
5. Open the discharge port connected to the dedicated pump and start pumping the well at a flow rate equal to or less than that of the natural formation. Note the time that purging begins on the *Low-Flow Purging and Sampling Log*. Check the piezometer at the well head for a continuous decrease in pressure. Maintain a steady flow rate while monitoring the pressure at the well head (if the pumping rate matches the flow rate of the natural formation the pressure should decrease to about zero at the well head). If the pressure reading reaches zero and drawdown of the water column within the well occurs, decrease the flow rate.
6. Measure the discharge rate of the pump with a graduated cylinder and a stopwatch. Record flow rate and total purged volume on the Low-Flow Purging and Sampling Log every three to five minutes. Total purged volume should be measured using a graduated cylinder or calculated based on the recorded purge rate and time interval between measurements.
7. Continue purging and begin to monitor and record the water quality indicator parameters every three to five minutes in the *Low-Flow Purging and Sampling Log*. Stable readings of temperature, pH, SEC, DO, turbidity and ORP indicate when a representative sample can be collected. The stabilization criterion is based on three successive readings of the water quality indicator parameters as shown in Table 1. Turbidity and ORP may not always be appropriate stabilization parameters and will depend on site-specific conditions. However, readings should be recorded because of their value for understanding groundwater conditions.

TABLE 1: Recommended Stabilization Criteria for Water Quality Indicator Parameters During Low-Flow Purging and Sampling

Parameter	Stabilization Criteria
Temperature	± 3% of reading
pH	± 0.1 pH units
Specific Electrical Conductance (SEC)	± 3% µS/cm

Dissolved Oxygen (DO)	± 10% (when DO is greater than 0.5 mg/L) If 3 consecutive DO readings are less than 0.5 mg/L, consider the values as stabilized.
Turbidity	± 10% NTUs (when turbidity is greater than 10 NTUs) If 3 consecutive turbidity readings are less than 10 NTUs, consider the values as stabilized.
Oxidation-Reduction Potential (ORP)	± 10 millivolts

8. Once stabilization of water quality parameters and pressure is achieved, and at least one system volume (including the volume of water in the pump and tubing) and the stabilized drawdown volume[1] have been purged from the well following water level stabilization, samples can be collected. Note the time that stabilization is achieved as the stop purge time on the purge log. The sample time, along with any QA/QC sample times, should also be recorded on the *Low-Flow Purging and Sampling Log.* Maintain the same pumping rate or reduce slightly for sampling as necessary in order to minimize disturbance of the water column. Disconnect the pump's tubing from the flow-through cell so that the samples are collected from the pump's discharge tubing. For samples collected for dissolved gases or VOC analyses, the pump tubing needs to be completely full of groundwater to prevent the groundwater from being aerated as it flows through the tubing. If a bladder pump is used to collect samples for dissolved gases or VOC analyses, the pump should be set so that one pulse will deliver a water volume that is sufficient to fill a 40-mL volatile organic analysis (VOA) vial. Generally, the sequence of the samples is immaterial unless filtered (dissolved) samples are collected. VOC samples are normally collected first, and filtered samples should generally be collected last (see below). All sample containers should be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container. When collecting VOC samples using VOA vials, a meniscus must be formed over the mouth of the VOA vial to eliminate the formation of air bubbles and head space prior to capping. VOA vials should be capped immediately following sample collection to minimize volatilization from the sample. Effervescence and colorimetric reactions should be recorded in the *Low-Flow Purging and Sampling Log.*

9. If a filtered (dissolved) metal sample is to be collected (or filtered samples for any other analytes are required), then an inline filter is fitted at the end of the discharge tubing and the sample is collected after the filter. The inline filter must first be flushed in accordance with manufacturer's recommendations and if there are no recommendations for flushing, a minimum of 0.5 to 1.0 liter of groundwater from the monitoring well must pass through the filter prior to sampling. (Note: Groundwater filter cartridges are dedicated sampling equipment. A new cartridge should be used at each sampling location. Do not attempt to clean filter cartridges. If the filter becomes clogged or groundwater flow is too slow, remove and replace with a new filter cartridge.)

[1] The USEPA's Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated January 19, 2010, defines stabilized drawdown volume as the volume of water between the initial water level and the stabilized water level.

10. After successful completion of sample collection, turn off the dedicated pump and close the connected discharge port. Drain all sample tubing and equipment into purge water containers and remove any additional sampling materials from the well.
11. Monitor and record the increase in pressure at the well head after completion of purging and sampling activities and record values in the *Low-Flow Purging and Sampling Log.*

Special Advisory 1: If stabilized drawdown in the well cannot be maintained at the pump's lowest purge rate, samples may be collected as soon as a minimum of one (1) system volume (including the volume of water in the pump and tubing) has been purged from the well. This information should be noted in *the Low-Flow Purging and Sampling Log*.

4.4 Purging and Sampling with a Non-Dedicated Pump

A flowing artesian well that does not have a dedicated pump, does not have a wellhead pressure gauge, or is improperly sealed at the surface will require additional considerations for purging and sampling. Purging and sampling methods for flowing artesian wells that do not have any specific well completion (incomplete artesian wells) are presented here. **Contact the field team supervisor for authorization before initiating these procedures.**

1. Prior to purging and sampling an incomplete flowing artesian well, identify any leaking surface flow, including suggestive indications such as nearby vegetative growth, weathering and erosion of well casing and monument, and other field observations. Record all observations.

2. If the well is actively flowing at the surface from the sampling port, install spill containment around the well, including but not limited to; surrounding the well with visqueen wrap, collecting surface flow into buckets, and channeling flow out of the well head directly into 5-gallon buckets or 55-gallon drums. Once surface flow has been controlled, flow rate can be determined.

3. Calculate the flow rate of the flowing artesian well using a 5-gallon bucket with marked denominations, or similar. Record the flow rate in the *Low-Flow Purging and Sampling Log.*

4. If using a non-dedicated pump, attach the tubing to the pump according to manufacturer's procedures, place the pump and support equipment at the well head and slowly lower the pump and tubing down into the monitoring well until the location of the pump intake is set at a predetermined location within the screen interval. Where possible, pre-measured tubing should be used to place the pump intake at the same depth as previous sampling events, or at a depth where there is known contamination within the screen interval. If there is no previous information for the well, the pump intake should be placed at the middle (or slightly above the middle) of the saturated screen interval. Record the pump depth in the *Low-Flow Purging and Sampling Log*. **Be prepared to contain overflow water at the top of the well.**
5. Connect the discharge line from the pump to a flow-through cell that at a minimum measures temperature, pH, SEC, DO, and ORP. Turbidity measurements can be made using a separate turbidity meter. The discharge line from the flow-through cell must be

directed to a container to hold purge water collected during purging and sampling of the well. Purge water will be collected in a portable tank (e.g., trailer-mounted polyethylene tank) and discharged to the on-site groundwater treatment system at the end of the sampling or when tank is full.

a. If the natural flow rate of the incomplete artesian well is excessive, resulting in issues with containment of groundwater at the surface, the pump can be placed higher in the water column before pumping, and pumped while being lowered through the water column to the screened interval.

6. Connect the air lines to the flow controller (if necessary) and begin pumping the well at a flow rate equal to or less than that of the natural formation. Note the time that purging begins on the *Low-Flow Purging and Sampling Log.* Maintain a steady flow rate and monitor the expected decrease in natural flow out of the artesian well. Once the water column has stabilized, record the flow rate and begin recording water quality readings.

7. Measure the discharge rate of the pump with a graduated cylinder and a stopwatch. Record flow rate and total purged volume on the Low-Flow Purging and Sampling Log every three to five minutes. Total purged volume should be measured using a graduated cylinder or calculated based on the recorded purge rate and time interval between measurements.

8. Monitor and record the water quality indicator parameters every three to five minutes in the *Low-Flow Purging and Sampling Log*. Stable readings of temperature, pH, SEC, DO, turbidity and ORP indicate when a representative sample can be collected. The stabilization criterion is based on three successive readings of the water quality indicator parameters as shown in Table 1. Turbidity and ORP may not always be appropriate stabilization parameters and will depend on site-specific conditions. However, readings should be recorded because of their value for understanding groundwater conditions.

9. Once stabilization of water quality parameters and pressure is achieved, and at least one system volume (including the volume of water in the pump and tubing) and the stabilized drawdown volume[2] have been purged from the well following water level stabilization, samples can be collected. Note the time that stabilization is achieved as the stop purge time on the purge log. The sample time, along with any QA/QC sample times, should also be recorded on the *Low-Flow Purging and Sampling Log.* Maintain the same pumping rate or reduce slightly for sampling as necessary in order to minimize disturbance of the water column. Disconnect the pump's tubing from the flow-through cell so that the samples are collected from the pump's discharge tubing. For samples collected for dissolved gases or VOC analyses, the pump tubing needs to be completely full of groundwater to prevent the groundwater from being aerated as it flows through the tubing. If a bladder pump is used to collect samples for dissolved gases or VOC analyses, the pump should be set so that one pulse will deliver a water volume that is sufficient to fill a 40-mL volatile organic analysis (VOA) vial. Generally, the sequence of the samples is immaterial unless filtered (dissolved) samples are collected. VOC samples

[2] The USEPA's Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated January 19, 2010, defines stabilized drawdown volume as the volume of water between the initial water level and the stabilized water level.

are normally collected first, and filtered samples should generally be collected last (see below). All sample containers should be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container. When collecting VOC samples using VOA vials, a meniscus must be formed over the mouth of the VOA vial to eliminate the formation of air bubbles and head space prior to capping. VOA vials should be capped immediately following sample collection to minimize volatilization from the sample. Effervescence and colorimetric reactions should be recorded in the *Low-Flow Purging and Sampling Log.*

10. If a filtered (dissolved) metal sample is to be collected (or filtered samples for any other analytes are required), then an inline filter is fitted at the end of the discharge tubing and the sample is collected after the filter. The inline filter must first be flushed in accordance with manufacturer's recommendations and if there are no recommendations for flushing, a minimum of 0.5 to 1.0 liter of groundwater from the monitoring well must pass through the filter prior to sampling. (Note: Groundwater filter cartridges are dedicated sampling equipment. A new cartridge should be used at each sampling location. Do not attempt to clean filter cartridges. If the filter becomes clogged or groundwater flow is too slow, remove and replace with a new filter cartridge.)
11. For non-dedicated systems, remove the pump from the monitoring well. Decontaminate the pump and hang the tubing within the well for the next sampling event. If tubing is damaged or otherwise needs replacing, remove and dispose of the tubing.
12. Close and lock the well. Note any leaks or surface flow and the overall condition of the well.

4.5 Equipment Decontamination

The electronic water level meter and the water quality meters will be decontaminated by the following procedures:

1. The water level meter will be hand washed with phosphate-free detergent (e.g., Alconox™) and a scrubber, then triple rinsed with distilled water, or steam-cleaned.
2. The water quality meters and flow-through cell (if used) will be rinsed with distilled water between sampling locations. No other decontamination procedures are necessary or recommended for these meters since they are sensitive instruments. After the sampling event, the flow-through cell and sensors must be cleaned and maintained per the manufacturer's requirements.

Sample tubing will either be replaced or be dedicated to an individual well. Non-dedicated pumps will be decontaminated between monitoring wells and prior to moving off-site. The pump and discharge line (including support cable and electrical wires which were in contact with the groundwater in the well casing) must be decontaminated by the following procedure:

1. The outside of the pump, support cable, and electrical wires must be pressure-sprayed with soapy water, tap water and distilled water. Use a bristle brush to help remove visible dirt and contaminants.

2. In accordance with the pump manufacturer's procedures, dismantle the pump and clean individual parts using cylindrical brushes and phosphate-free detergent (e.g., Alconox™). Double rinse the parts with tap water and then distilled water. Reassemble the pump following the manufacturer's procedures and replacing disposable parts (e.g., the bladder and grab plates) with new parts.
3. If free product is encountered or other conditions are expected, additional decontamination steps may be required. Other decontamination procedures may be proposed, but must be reviewed and approved by the client prior to implementation.
4. Decontamination water will be collected in a portable tank (e.g., trailer-mounted polyethylene tank) and discharged to the on-site groundwater treatment system.

4.6 Quality Control Procedures

All field Quality Control (QC) samples must be prepared the same as primary samples with regard to sample volume, containers, and preservation. The sample handling and chain-of-custody procedures for the QC samples will be identical to the primary samples. The following are QC samples that may be collected during groundwater sampling:

- A field duplicate is an independent sample collected as close as possible to the same time that the primary sample is collected and from the same source. Field duplicates are used to document sample precision. Field duplicates will be labeled and packaged in the same manner as primary samples. Field duplicates are analyzed for the same suite of parameters as the primary samples. The frequency of analysis of field duplicates is generally one for every 20 primary samples, but may vary depending on project requirements.
- Equipment blanks are obtained by running distilled or deionized water over or through the sample collection equipment after it has been decontaminated, and capturing the water in the appropriate sample containers for analysis. Equipment blanks are analyzed for the same suite of parameters as the primary samples. The frequency of analysis of equipment blanks is generally one for every 20 primary samples, but may vary depending on project requirements.
- Field blanks are used to assess the presence of contaminants arising from field sampling procedures. Field blank samples are obtained by filling a clean sampling container with reagent-grade deionized water. Field blanks are analyzed for the same suite of parameters as the primary samples. Field blanks may or may not be incorporated into a groundwater sampling plan depending on project requirements.
- Trip blanks are sample containers that are used to evaluate sample cross-contamination of VOCs during shipment. For groundwater sampling, trip blanks consist of hydrochloric acid-preserved, analyte-free, deionized water prepared by the laboratory in VOA vials that will be carried to the field, stored with the samples, and returned to the laboratory for VOC analysis. Generally, one trip blank is required to accompany each sample shipping container or cooler that contains samples for VOC analysis; however, this may vary depending on project requirements.

4.7 Sample Handling and Custody

Samples will be collected, handled, and stored in such a manner that they are representative of their original condition and chemical composition. Identification of samples and maintenance of custody are important elements that must also be utilized to ensure samples characterize site conditions. All samples will be properly identified and maintained under chain of custody protocol to protect sample integrity. The following sections discuss the sample handling and custody requirements.

4.7.1 Sample Identification

To maintain consistency, a sample identification convention including unique identifiers for all groundwater and QC samples must be developed and followed throughout the project. The sample identifiers will be entered onto the sample labels, field forms, chain of custody forms, and other records documenting sampling activities. Sample names will include the well name, sample date, and appropriate sample code and number (if applicable). Example sample names are as follows:

TABLE 2: Sample identification convention

Sample Type	Example Sample Name (for well M-95)
Primary Sample	M-95-20161108
Field Duplicate	M-95-20161108-FD1
Field Blank	M-95-20161108-FB1
Equipment Blank	M-95-20161108-EB1
Trip Blank	M-95-20161108-TB1

4.7.2 Sample Labels

A sample label will be affixed to all sample containers sent to the analytical laboratory. Field personnel will complete an identification label for each sample with the following information written in waterproof, permanent ink:

- Client and project number
- Sample location and depth, if relevant
- Unique sample identifier
- Date and time sample collected
- Filtering performed, if any
- Preservative used, if any
- Name or initials of sample collector
- Analyses or analysis code requested

The use of pre-printed sample labels is preferred in order to reduce sample misidentification problems due to transcription errors. Sample labels must be completed and affixed to the sample container in the field at the time of sample collection.

If errors are made on a sample label, corrections will be made by drawing a single line through the error and recording the correct information. Corrections will be dated and initialed.

4.7.3 Containers, Preservation, and Hold Time

Each lot of preservative and sampling containers will be certified as contaminant-free by the supplier. All preserved samples will be clearly identified on the sample label and *Chain of Custody* form. If samples requiring preservation are not preserved, field records will clearly specify the reason for the discrepancy.

Chemical activity continues in the sample until it is either analyzed or preserved. Once the sample has been preserved, the sample may be held for a period of time before analysis. The time from the collection of the sample to the analysis is defined as the hold time. The hold time varies depending on the media being sampled and the analyses being performed. The collection, preservation, and analysis of samples must be conducted to avoid exceeding relevant hold times. If the hold time for a sample is exceeded, the sample should not be analyzed. If a sample is inadvertently analyzed despite having exceeded the hold time, the sample collector should inform the laboratory to not report the results and the sample should be recollected.

4.7.4 Sample Handling and Transport

Proper sample handling techniques are used to ensure the integrity and security of the samples. Samples for field measured parameters will be analyzed immediately in the field and recorded in the appropriate field forms. Samples for laboratory analysis will be transferred immediately to appropriate laboratory supplied containers in accordance with the following sample handling protocols:

- Don clean gloves before touching any sample containers, and take care to avoid direct contact with the sample;
- Samples will be quickly observed for color, appearance, and composition and recorded as necessary;
- The sample container will be labeled before or immediately after sampling;
- Sample containers and liners will be capped with Teflon®-lined caps before being placed in Ziploc™-type plastic bags. The samples will be placed in an ice chest kept at 4 °C for transport to the laboratory.
- All sample lids will stay with the original containers, and will not be mixed.
- Sample bottles will be wrapped in bubble wrap as necessary to minimize the potential for breakage during shipment.
- The *Chain of Custody* form will be placed in a separate plastic bag and taped to the cooler lid or placed inside the cooler. A custody seal will be affixed to the cooler if the samples are to be shipped by commercial carrier. For shipped samples, U.S. Department

of Transportation shipping requirements will be followed and the sample shipping receipt will be retained in the project files as part of the permanent *Chain of Custody* document.

4.7.5 Sample Chain of Custody

Sample chain of custody procedures will be used to maintain and document sample integrity during collection, transportation, storage, and analysis. A sample is considered to be under the control of, and in the custody of, the responsible person if the samples are in their physical possession, locked or sealed in a tamper-proof container, or stored in a secure area.

The *Chain of Custody* form provides an accurate written record that traces the possession of individual samples from the time of collection in the field until they are accepted at the analytical laboratory. The *Chain of Custody* form also documents the samples collected and the analyses requested. The sample collector will record the following information on the *Chain of Custody* forms:

- Client and project number
- Name or initials and signature of sample collector
- Name of destination analytical laboratory
- Name and phone number of field team supervisor in case of questions
- Unique sample identifier for each sample
- Date and time of collection for each sample
- Number and type of containers included for each sample
- Analysis or analyses requested for each sample
- Preservatives used, if any, for each sample
- Sample matrix for each sample
- Any filtering performed, if applicable, for each sample
- Signatures of all persons having custody of the samples
- Dates and times of transfers of custody
- Shipping company identification number, if applicable
- Any other pertinent notes, comments, or remarks

Blank spaces on the *Chain of Custody* will be crossed out and initialed by the field sample collector between the last sample listed and the signatures at the bottom of the sheet.

The field sample collector will sign the *Chain of Custody* and will record the time and date at the time of transfer to the laboratory or an intermediate person. A set of signatures is required for each relinquished/received transfer, including internal transfer. The original imprint of the *Chain of Custody* will accompany the sample containers and a duplicate copy will be kept in the project file.

If the samples are to be shipped to the laboratory, the original *Chain of Custody* relinquishing the samples will be sealed inside a plastic bag within the ice chest, and the chest will be sealed with custody tape that has been signed and dated by the last person listed on the *Chain of Custody*. U.S. Department of Transportation shipping requirements will be followed and the sample shipping receipt will be retained in the project files as part of the permanent *Chain of Custody* document. The shipping company (e.g., Federal Express, UPS) will not sign the *Chain of Custody* forms as a receiver; instead the laboratory will sign as a receiver when the samples are received.

5. PRECAUTIONS

Certain precautions should be taken to ensure safety during the implementation of this FGD. It is important to always remain alert and aware of your surroundings. All personnel performing on-site operations with the potential for exposure to hazardous substances or health hazards are required to be 40-hour trained in accordance with Code of Federal Regulations (CFR) 1910.120 and will meet the personnel training requirements in accordance with 29 CFR 1910.120(e).

The laboratory must be certified by the appropriate regulating agency for the analyses to be performed.

The activities described in this FGD require the implementation of a site-specific Health and Safety Plan to inform personnel of the hazards associated with this work and to describe the methods that will be employed to mitigate those hazards. The Health and Safety Plan must be prepared and approved by the field team supervisor and Project Health and Safety Coordinator prior to initiating field work.

6. RECORDKEEPING

Information collected during groundwater sampling may be recorded on individual field forms. A project-specific Field Logbook may replace any of the individual field forms with the exception of the *Chain of Custody* form. All field forms should be reviewed by field personnel and the field team supervisor for completeness. Following review by the field team supervisor, the original field records will be kept in the project file. The following forms may be used to document the field activities:

- Field Investigation Daily Log
- Water Level Measurement Log
- Low-Flow Purging and Sampling Log
- Equipment Calibration Log
- Chain of Custody

The *Field Investigation Daily Log* will be completed for each day of fieldwork containing (at a minimum) the times and descriptions of the work performed, the activities any subcontractors or visitors on-site, arrival and departure times for all involved, and any other pertinent information. For larger projects, or when otherwise deemed appropriate by the client, this information may alternatively be recorded in a Field Logbook. In these cases, a separate Field Logbook must be used for each project or site.

The *Water Level Measurement Log* will be used to record water level measurements for all wells. The type, serial number, and calibration date for the water level measuring device will be included on this form. Additionally, this form will be used to record general observations of the conditions of the wells, wellheads, well boxes, and/or monuments.

The *Low-Flow Purging and Sampling Log* will be used to record the details of purging and sampling information for each well including the depth of the pump, purge rates, and volume purged from each well. This form will also be used to record all of the measurements of drawdown and water quality indicator parameters used for evaluating stabilization.

The *Equipment Calibration Log* will be used to document the calibration and status of any measuring instruments used in the field (e.g., PID/FID, water level measuring device, water quality meters, etc.). The frequency and method of calibration will depend on the instrument. Any instruments used will be used in accordance with the factory-provided operating and/or service manuals.

Sample names, date/times, analyses to be performed, and other pertinent information will be recorded on the *Chain of Custody* form as a means of identifying and tracking the samples.

ATTACHMENT 1

TABLES 1-6 IN EXCEL FORMAT (PROVIDED ELECTRONICALLY)

ATTACHMENT 2

DEPTH TO WATER (DTW) EDD TEMPLATE (PROVIDED ELECTRONICALLY)

ATTACHMENT 3

FIELD PARAMETERS EDD TEMPLATE (PROVIDED ELECTRONICALLY)

ATTACHMENT 4

LABORATORY EDD FORMAT SPECIFICATIONS (PROVIDED ELECTRONICALLY)