Quality Assurance Project Plan, Revision 0

Nevada Environmental Response Trust Site
Henderson, Nevada

Prepared by:
ENVIRON International Corporation
Emeryville, California

Date:
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21-34800I

ENVIRON

Quality Assurance Project Plan, Revision 0

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

Nevada Environmental Response Trust (Trust) 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 the Trust. 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: 1/23/14

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

Responsible Certified Environmental Manager (CEM) for this project

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

January 24, 2014

John M. Pekala, PG
Senior Manager

Date

Certified Environmental Manager
ENVIRON International Corporation
CEM Certificate Number: 2347
CEM Expiration Date: September 20, 2014

The following individuals provided input to this document:

John M. Pekala, PG
Allan J. DeLorme, PE
Jessica E. Donovan, PG
Lynne Haroun, MPH
Christopher J. Ritchie, PE
Christopher M. Stubbs, PhD, PE
Kate Logan, MPA
Dan Clark
Craig Knox
Emily Lisker

Project Title Quality Assurance Project Plan (QAPP)
Site Name Nevada Environmental Response Trust Site
Site Location Henderson, Nevada
Company ENVIRON International Corporation
Telephone (510) 655-7400

QAPP Reviewed and Approved:

______________________________ Date: January 24, 2014
Allan J. DeLorme, PE
ENVIRON Project Manager

______________________________ Date: January 24, 2014
John M. Pekala, PG
ENVIRON Project Quality Assurance/Quality Control Officer

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Acronyms and Abbreviations

BMI	Black Mountain Industrial
CEM	certified environmental manager
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
DI	deionized
DO	Dissolved Oxygen
DQO	data quality objective
DVSR	data validation summary report
ENVIRON	ENVIRON International Corporation
EB	equipment blank
EC	electrical conductivity
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FB	field blank
FD	field duplicate
FSP	Field Sampling Plan
GWETS	Groundwater Extraction and Treatment System
HASP	Health and Safety Plan
HRA	Health Risk Assessment
ICP	inductively coupled plasma
ISRACR	Interim Soil Removal Action Completion Report
LCS	laboratory control standard
LCSD	laboratory control standard duplicates
LDC	Laboratory Data Consultants, Inc.
MDA	minimum detectable activity
MDL	method detection limit
mg/L	milligrams per liter (parts per million)
MPA	Masters of Public Affairs
MPH	Masters of Public Health
MS/MSD	matrix spike/matrix spike duplicate

NDEP	Nevada Division of Environmental Protection
NELAC	National Environmental Laboratory Accreditation Conference
NERT	Nevada Environmental Response Trust
ORP	oxygen reduction potential
OSHA	Occupational Safety and Health Administration
OVM	Organic Vapor Meter
PE	Professional Engineer
PG	Professional Geologist
PM	Project Manager
PQL	practical quantitation limit
QA	quality assurance
QAM	quality assurance manual
QAPP	Quality Assurance Project Plan
QC	quality control
RBC	risk based concentration
RI/FS Work Plan	Remedial Investigation and Feasibility Study Work Plan
RISB	soil boring
RISG	soil gas samples
RIT	trench samples
RL	reporting limit
RPD	relative percent difference
RPM	Remedial Project Manager
RSD	
SDG	sample delivery group
Site	Nevada Environmental Response Trust (NERT) Site
SMP	Site Management Plan
SOP	standard operating procedures
SRM	standard reference material
TB	trip blank
TEQ	toxicity equivalents
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compounds

Distribution List

This QAPP will be distributed to the entities listed below. The QAPP may also be distributed to other project personnel including, but not limited to, client representatives and consultants, analytical laboratories, remediation contractors, and subcontractors, as needed.

Weiquan Dong
Nevada Department of Environmental Protection
2030 East Flamingo Road, Suite 230
Las Vegas, Nevada 89119

Nevada Environmental Response Trust
35 East Wacker Drive, Suite 1550
Chicago, Illinois 60601

BMI Compliance Coordinator
2030 East Flamingo Road, Suite 230
Las Vegas, Nevada 89119

Brian Giroux
McGinley & Associates, Inc.
6280 South Valley View Boulevard, Suite 604
Las Vegas, Nevada 89118

Nevada Department of Environmental Protection
c/o McGinley and Associates
815 Maestro Drive
Reno, Nevada 89511

Tanya O'Neill
Foley & Lardner LLP
777 East Wisconsin Avenue
Milwaukee, Wisconsin 53202

ENVIRON International Corporation
2200 Powell Street, Suite 700
Emeryville, California 94608

<u>Analytical Laboratories</u>

TestAmerica Laboratories, Inc. (TestAmerica)
Sushmitha Reddy
17461 Derian Avenue, Suite 100
Irvine, California 92614

Alpha Analytical, Inc. (Alpha Analytical)
Edana Fruciano
8991 Hom Road, Suite C
Sacramento, California 95827

McCampbell Analytical, Inc. (McCampbell)
Jennifer Lagerbom
1534 Willow Pass Road
Pittsburg, California 94565

EMSL Analytical, Inc. (EMSL)
Daniel Kocher
2235 Polvorosa Avenue, Suite 230
San Leandro, California 94577

Data Validation Contractors

Laboratory Data Consultants, Inc. (LDC)
Andrew Kong
2701 Loker Avenue West, Suite 220
Carlsbad, California 92010

Neptune and Company, Inc. (Neptune)
Rebecca Shircliff
1435 Garrison Street, Suite 110
Lakewood, Colorado 80215

ENVIRON is responsible for ensuring that all project personnel have the most recent version of this QAPP. Individual pages include a revision number; any revised pages will be clearly marked with a new revision number and a list of revised pages will be distributed with any revisions.

1.0 Project Management/Data Quality Objectives

1.1 Introduction

On behalf of the Nevada Environmental Response Trust (the Trust), ENVIRON International Corporation (ENVIRON) prepared this Quality Assurance Project Plan (QAPP) to describe the quality assurance/quality control (QA/QC) procedures to be used during investigation activities described in the Remedial Investigation and Feasibility Study (RI/FS) Work Plan, Revision 1 (the "RI/FS Work Plan") (ENVIRON 2014a) prepared by ENVIRON for the Nevada Environmental Response Trust (NERT) Site located in Clark County, Nevada (the Site).

The purpose of this QAPP is to (1) describe the QA/QC procedures that the project team will follow during sampling and analysis; and (2) assure reporting of data that are representative of field conditions, meet the established data quality objectives (DQOs), and are of acceptable quality to meet industry standards. The QAPP will be implemented in conjunction with the RI/FS Work Plan, which contains a description of the investigation activities to be performed at the Site and the Field Sampling Plan (FSP) (ENVIRON 2014b), which specifies the methods and procedures to be used to collect representative samples. To avoid redundancy, the RI/FS Work Plan and FSP will be referenced as necessary in this QAPP.

Certain other documents are referenced herein as necessary to describe activities performed pursuant to the Interim Consent Agreement (Agreement) for the Site, effective February 14, 2011. These include the Interim Soil Removal Action Completion Report (ISRACR) (ENVIRON 2012), Annual Groundwater Monitoring Reports (Annual Reports; e.g. ENVIRON 2013a), and the Site Management Plan (SMP), Revision 1 (ENVIRON 2013b).

This QAPP has been prepared in general accordance with the applicable elements of several United States Environmental Protection Agency (USEPA) guidance documents, including *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4 (USEPA, 2006); *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5 (USEPA, 2001); and *Guidance for Quality Assurance Project Plans*, EPA QA/G-5 (USEPA, 2002).

1.2 QAPP Objectives and Use

Quality Assurance (QA) and Quality Control (QC) are activities undertaken to achieve the goal of producing data that accurately characterize the sites and materials that have been sampled. QA is generally understood to be more comprehensive than QC. QA can be defined as the integrated system of activities that ensures that a project meets defined standards.

QC is the basic building block of data quality. It starts with activities whose purpose is to control quality at the source by finding problems and defects. At its simplest, QC is inspecting, testing or checking data to make sure it is correct, valid, or otherwise in accordance with established specifications. The intent is to identify data that is not correct, and either correct or eliminate it, to make sure it conforms to the specifications, and/or functions as required. QC does not ensure quality, it only finds instances where quality is absent or below established criteria.

QA asserts that data quality can be improved by looking 'further up the line'. It is aimed at preventing nonconforming or invalid data. QA can be defined as the integrated system of activities that ensures that a project meets defined standards. QA still has QC at its core to control data quality, but it goes beyond testing or inspection to also consider related activities or processes (such as training, document control and audits) that may be resulting in systemic and recurring data quality issues. The overall goal of the QA/QC procedures and specifications established in this QAPP is to ensure that comparable and representative data are produced during the implementation of the RI/FS Work Plan and that data quality is consistently assessed and documented with respect to its precision, accuracy, sensitivity, and completeness. The specific QAPP objectives are to:

- Provide standardized methods and quality specifications for all anticipated field sampling, analysis, and data review procedures;
- Provide guidance and criteria for selected field and analytical procedures; and
- Establish procedures for reviewing and documenting compliance with field and analytical procedures.

This QAPP documents the planning, implementation, and assessment procedures for the QA/QC program to be followed during implementation of the RI/FS Work Plan. The QAPP will be expanded if further sampling work activities or analyses are identified. Similarly, should the list of chemicals of interest change, this QAPP will be modified to reflect those changes.

1.3 Project Organization/Roles and Responsibilities

Implementation of the approved QAPP requires the involvement of a wide range of individuals and organizations working together as a team. The project organization, and roles and responsibilities of the individuals involved are defined in the QAPP to promote a clear understanding of the role that each party plays, and to provide the lines of authority and reporting for the project. Personnel assigned to the project will be required to familiarize themselves with pertinent protocols and procedures presented in this QAPP. Key project positions relate to project oversight, project management, sampling and analytical data acquisition management, data validation management, and database management.

ENVIRON, on behalf of the Trust, will be responsible for the direction and quality of all phases of the RI/FS Work Plan implementation including QA/QC and will perform the scope of work as directed by the Trust to the satisfaction of Nevada Division of Environmental Protection (NDEP). The individuals participating in the project and their specific roles and responsibilities are discussed below:

Weiquan Dong, NDEP Remedial Project Manager
The NDEP Remedial Project Manager (NDEP RPM) has overall responsibility for regulatory oversight of all phases of the project and will be responsible for reviewing and approving the QAPP.

Allan J. DeLorme, PE, ENVIRON Project Manager
The ENVIRON Project Manager (PM) is responsible for technical and policy decisions involving the project, including interaction and coordination with ENVIRON project staff, and NDEP. The ENVIRON PM is also responsible for reviewing the sampling program(s) and associated field

activities for compliance with the QAPP, including QA/QC, strategies, and review of all documents. The ENVIRON PM will have primary responsibility for project QA/QC and will evaluate and, if necessary, implement any corrective actions regarding data quality issues.

John M. Pekala, PG, CEM, ENVIRON Project Quality Assurance/Quality Control Officer
The QA/QC Officer will enforce implementation of QA/QC procedures during the field sampling program and is responsible for reviewing the project QA/QC program as it relates to the collection and completeness of data from field and laboratory operations. During the contracting process the QA/QC Officer will ensure that method control limits are sufficient to meet this QAPP and are adequate for the use of the data. After receiving analytical results, the QA/QC Officer will evaluate the field and laboratory data against the requirements of the QAPP.

ENVIRON Task Leaders
The ENVIRON Task Leaders are responsible for scope, cost, and technical considerations of the project; staff and project coordination; and implementation and review of overall project quality of the collection, completeness, and presentation of the data. If field conditions require modifications to protocol outlined in the QAPP, or if questions arise, the ENVIRON Task Leaders will be the primary contact for direction of field personnel. The ENVIRON Task Leaders will also be responsible for overseeing review of the QA/QC programs related to the compilation of data.

- **John M. Pekala, PG, CEM, ENVIRON Field Task Leader**
  This Task Leader is responsible for overall implementation of the approved work plan, including work conducted by the Site contractor and is responsible for general oversight of field activities.
- **Lynne Haroun, MPH, ENVIRON Heath Risk Assessment (HRA) Task Leader**
  This Task Leader will work with the other Task Leaders and QA Officer to ensure that work is conducted in compliance with health risk assessment objectives and applicable QA procedures.
- **Jessica E. Donovan, PG, ENVIRON Analytical Task Leader**
  This Task Leader is responsible for coordination with the analytical laboratories, review of analytical data, and tracking data through the data validation and reporting processes and will work with the other ENVIRON Task Leaders to ensure that work is conducted in compliance with project-specific objectives and applicable QA/QC procedures.

Laboratory Project Managers (PMs)
Each Laboratory PM is the primary point-of-contact at the analytical laboratory for the project, and is responsible for ensuring project data meet the QA/QC objectives established herein. The Laboratory PM is also responsible for tracking the progress of testing in the laboratory and ensuring the timely delivery of data or other laboratory deliverables to the project team. The laboratories used for chemical and radiochemical soil and groundwater testing will be certified by the State of Nevada for the analysis of interest. In the absence of Nevada certification for a particular analysis, as is the case for soil gas and asbestos, National Environmental Laboratory Accreditation Conference (NELAC) certification will be considered an acceptable substitute.

- **Sushmitha Reddy, Laboratory Project Manager at TestAmerica Laboratories, Inc. (TestAmerica)**
  The primary subcontracted laboratory for soil and groundwater analysis (with the exception of asbestos and organic acid analysis) for this project is TestAmerica's Irvine, California location. Because of the variety of specialized analyses required for this project, several additional Nevada-certified TestAmerica laboratories will be used during this project including the following TestAmerica laboratories: Sacramento, California; Richland, Washington; Denver, Colorado and St. Louis, Missouri. The Laboratory PM will coordinate with individual laboratory managers for this project. The primary laboratory may also subcontract analyses to other certified laboratories that can meet the requirements of this QAPP upon written approval of the ENVIRON PM or ENVIRON Analytical Task Leader and following consultation with NDEP.

- **Edana Fruciano, Technical Representative at Alpha Analytical, Inc. (Alpha Analytical)**
  TestAmerica's Irvine location will subcontract with Alpha Analytical for the analysis of organic acids in soil and groundwater, which is a Nevada-certified laboratory. Organic acid analysis will take place at Alpha Analytical's laboratory in Sparks, Nevada.

- **Jennifer Lagerbom, Laboratory Project Manager at McCampbell Analytical, Inc. (McCampbell)**
  The primary subcontracted laboratory for soil gas analysis for this project is McCampbell Analytical, Inc. (McCampbell), which is a NELAC certified laboratory. Soil gas analysis will take place at McCampbell's laboratory in Pittsburg, California.

- **Daniel Kocher, Laboratory Project Manager at EMSL Analytical, Inc. (EMSL)**
  The primary subcontracted laboratory for asbestos analysis for this project is EMSL, which is a NELAC certified laboratory. Analysis for asbestos will take place at EMSL's laboratory in San Leandro, California.

Data Validation Project Managers

A Data Validation PM is responsible for validating and managing the data, including review of data from the laboratory at the appropriate level, adding any qualifiers to call-out differences between guidelines and the reported data, and preparing the data for electronic submission to the database.

- **Andrew Kong, Laboratory Data Consultants, Inc. (LDC), Data Validation Project Manager**
  LDC of Carlsbad, California will be providing data validation for soil, groundwater and soil gas samples collected for this project, with the exception of samples analyzed for asbestos.

- **Rebecca Shircliff, Neptune and Company, Inc. (Neptune), Data Validation Project Manager**
  Neptune of Lakewood, Colorado will provide data validation for all samples analyzed for asbestos during this project.

Members of the project team are subject to change. A change in team members alone will not necessitate a revision to the QAPP.

1.4 Problem Definition and Background

The problem definition and Site background are presented in the RI/FS Work Plan (ENVIRON 2014a). Additional details regarding Site history, historical and future land use, and potential contaminant releases at the Site are presented in the ISRACR (ENVIRON 2012) and the Annual Reports (ENVIRON 2013a).

1.5 Project Description

The work to be completed as described in the RI/FS Work Plan includes soil, groundwater, and soil gas sampling and chemical analyses to fill data gaps remaining from previous investigations, thereby providing additional information, including data regarding the magnitude and extent of selected chemicals in soil and groundwater at the Site. This information will be used to support the overall purpose of the RI/FS process, which is "to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site" (USEPA 1988).

1.6 Data Quality Objectives

The overall goal of the QA/QC procedures and specifications established in this QAPP is to ensure that comparable and representative data are produced and that data quality is consistently assessed and documented in order to accomplish the objectives of the RI/FS Work Plan. To achieve this goal, ENVIRON has followed a systematic approach in the planning of this project equivalent to the USEPA DQO Process, as described in *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4 (USEPA 2006).

The DQO Process is a series of logical steps that guides users to a plan for the resource-effective acquisition of environmental data. It is used to establish performance and acceptance criteria, which serve as the basis for designing a plan for generating data of sufficient quality and quantity to support the goals of the study. The DQO Process consists of seven iterative steps; the iterative nature of the DQO Process allows one or more of these steps to be revisited as more information on the problem is obtained. The seven steps are as follows:

1. State the Problem
2. Identify the Goal of the Study
3. Identify the Information Inputs
4. Define the Boundaries of the Study
5. Develop the Analytical Approach
6. Specify Performance of Acceptance Criteria
7. Develop the Detailed Plan for Obtaining Data

The approach to the DQO process is described in Section 2 the FSP (ENVIRON 2014b). Following the DQO Process has driven the development of the FSP, the choice of analytical methods, the establishment of relevant data validation procedures, and related aspects of the collection of environmental measurement data. The DQOs specify the data type, quality, quantity, and uses needed to make decisions and are the basis for designing data collection activities. The QA/QC procedures for this project require that the data meet minimum requirements for precision, accuracy, completeness, representativeness, comparability, and sensitivity. The procedures and minimum requirements are presented in the subsequent sections of this QAPP.

The primary and all other subcontracted laboratories will perform analytical work in accordance with this QAPP as well as with their internal Standard Operating Procedures (SOPs) and QA Manuals, which comply with NELAC standards and USEPA protocols established in Test Methods for Evaluating Solid Waste, SW-846, Update III, dated June 1997, (SW-846) (USEPA 1997). The QA Manuals include names of the responsible oversight individuals, QA/QC manual review and update procedures, organization and responsibilities of various individuals, QA/QC objectives and reports, QA/QC policies and procedures including sampling and receiving policies, equipment calibrations and maintenance information, necessary reagents and standards, extraction and analysis methods, data review and reporting processes, QA/QC procedures, system audits and corrective actions, certifications, recordkeeping and sample retention, sample disposal procedures, recent method detection limit (MDL) studies, and other QA/QC criteria relevant to the specific analytical methods.

The QA/QC Officer will evaluate the field and laboratory data against the requirements of the QAPP. Each analytical laboratory will provide the most current QA/QC information, SOPs, and QA Manuals to the QA/QC Officer(s) that specify laboratory QA/QC samples and acceptance levels for each method. Laboratories contracted to perform analyses for this project are summarized on Table 1. The project specific MDLs, reporting limits (RLs), and QC limits for the analytes to be tested are provided in Tables 2 through 5.

Project laboratories will either use the limits specified in this QAPP or propose equally or more stringent statistically calculated QC limits. Specific QA/QC samples will be analyzed to satisfy the DQOs. The QA/QC samples to be used and the minimum frequency of their analysis for this project are summarized in Table 6. The data obtained will conform to the quality control requirements specified in this QAPP. The project QA/QC Officer will be responsible for performing the data quality evaluations, the results of which will be included in the QA/QC sections of reports. A discussion of the measurement parameters and how they will be used to evaluate project analytical data follows.

This QAPP, and any QAPP addendum, collectively, will specify explicitly the data that are needed to meet the objectives of the project and how that data will be used. In addition, this QAPP discusses implementation of control mechanisms and standards that are used to obtain data of sufficient quality to meet all project DQOs. The project DQOs provide an internal means for control and review so the environmentally related measurements and data collected by the project team are valid, scientifically sound, and of known, acceptable, and documented quality.

1.6.1 Characteristics of Data Quality

The term 'data quality" refers to the level of uncertainty associated with a particular data set. Data quality associated with environmental measurement is a function of the sampling plan rationale and procedures used to collect the samples, as well as of the analytical methods and instrumentation used in making the measurements. Uncertainty cannot be eliminated entirely from environmental data. However, QA programs effective in measuring uncertainty in data are employed to monitor and control excursions from the desired DQOs. Sources of uncertainty that can be traced to the sampling component include poor sampling plan design, incorrect sample handling, faulty sample transportation, and inconsistent use of SOPs. The most common sources of uncertainty that can be traced to the analytical component of the total measurement system are problems associated with calibration and contamination.

The purpose of this QAPP is to ensure that the data collected are of known and documented quality and useful for the purposes for which they are intended. The procedures described are designed to obtain data quality indicators for each field procedure and analytical method. To ensure that quality data continues to be produced, systematic checks must show that test results and field procedures remain reproducible and that the analytical methodology is actually measuring the quantity of analytes in each sample.

All laboratory analytical data will be generated by a Nevada- or NELAC-certified laboratory and validated by the data validation consultant. This applies to the primary laboratory and any laboratory subcontracted by the primary laboratory. Laboratories must have an in-place program for data reduction, validation, and reporting as discussed in this QAPP. The reliability and credibility of analytical laboratory results can be corroborated by the inclusion of a program of scheduled replicate analyses, analyses of standard or spiked samples, and analysis of split samples with QA laboratories for some projects. Regularly scheduled analyses of known duplicates, standards, and spiked samples are a routine aspect of data reduction, validation, and reporting procedures.

1.6.2 Measurement Performance Criteria

Performance and acceptance criteria are often expressed in terms of data quality indicators (DQIs). The principal data quality indicators are sensitivity, accuracy, precision, completeness, representativeness, and comparability. These DQIs are discussed below.

Sensitivity refers to the amount of analyte necessary to produce a detector response that can be reliably detected (the "Method Detection Limit" or "MDL") or quantified (the "Reporting Limit" or "RL," which is also known as the "Practical Quantitation Limit" or "PQL"). Where practicable, to reduce the possibility of false negatives, the RL of each contaminant of concern should be lower than corresponding screening value. In cases where screening values are below RLs, the MDLs can be used to evaluate the presence or absence of the analyte from environmental samples. Furthermore, to be considered valid for project use under normal conditions, the concentrations of contaminants of concern in any blank, e.g., equipment blank, field blank, and/or method blank, should not exceed the laboratory RLs, unless a higher number is considered valid to reflect actual field and laboratory conditions. Ideally, and to reduce the possibility of false positives, all blanks associated with project samples should be free of detectable contamination. The project specific MDLs, PQLs, and screening values for the analytes to be tested are summarized in Tables 2 through 5.

In the case of radionuclides, the actual result of the analysis is reported regardless of the minimum detectable activity (MDA) metric (NDEP 2008). The MDA is a sample-specific value defined as the lowest level of activity in a sample that is statistically distinguishable from a sample with no activity. For radiochemical analysis the MDA is functionally equivalent to the MDL and no PQL is reported.

Asbestos data will be reported as a raw asbestos fiber counts per sample (NDEP 2008). While there are no RLs with this method, sensitivity is calculated by the concentration of protocol structures per volume of PM10.

Accuracy of the data is the measure of the overall agreement of a measured value to the true value. It includes a combination of systematic error (bias) and random error (precision) components of sampling and analytical operations. It reflects the total error associated with a measurement. A measurement is considered accurate when the value reported does not differ from the true value or known concentration of a spike sample or standard beyond an acceptable margin. Field and laboratory activities are subject to accuracy checks.

To estimate the accuracy of the data, a selected sample is spiked with a known amount of a standard and is analyzed; the results of which are used to calculate percent recovery. Accuracy of laboratory analyses will be assessed by comparing results for a laboratory control sample, surrogate standard, matrix spike (MS) or laboratory control standard (LCS), and initial and continuing calibration of instruments to control limits. Laboratory accuracy is expressed as the percent recovery (%R). If the %R is determined to be outside of acceptance criteria, the data will be flagged for reporting purposes. Accuracy goals vary for analytical data by the type of analysis employed. Laboratory goals are established as part of the laboratory QA/QC program as described in the QA Manual and SOPs.

Accuracy of field measured data will be maintained by keeping the field instruments in proper working condition and calibrating as specified by operation manuals. The specific maintenance and calibration procedures in the operation manuals will be followed. The results of calibrations will be evaluated against the limits established in operation manuals specific to each instrument and recorded in field logbooks. Field accuracy will also be assessed in part through adherence to all sample handling, preservation, and holding time requirements as described in this QAPP.

Precision of the data is the measure of reproducibility or agreement among repeated measurements of the same sample under identical or substantially similar conditions. It is represented as either a range of values or as a standard deviation about the mean value. Precision goals vary for analytical data by the type of quality control samples measured. Both laboratory and field quality control samples are utilized to measure precision. Precision may be expressed as a percentage of the mean of measurements, such as relative range or relative standard deviation.

Analytical precision is a measurement of the variability associated with duplicate or replicate analyses of the same sample in the laboratory. Analytical precision is determined by analysis of laboratory quality control samples, such as duplicate control samples, matrix spike duplicates (MSD) or laboratory control standard duplicates (LCSD), or sample duplicates. These samples should contain concentrations of an analyte above the RL. The most commonly used estimates of precision are relative standard deviation (RSD) and the relative percent difference (RPD) when only two samples are used. The objectives for RPDs are ≤30% RPD for aqueous samples and ≤50% for solids and air samples. Samples outside the limits will be noted and either excluded from the data set or reported and explained with qualifiers.

Total precision is a measurement of the variability associated with the entire sampling and analytical process. It is determined by analysis of duplicate samples, which measure variability introduced by the laboratory and field operations. Field duplicate samples are analyzed to assess field and analytical precision.

Each laboratory's QA Manuals set forth the frequency with which laboratory duplicate samples (i.e., LCSD and MSD) will be analyzed as well as the allowable difference in results for laboratory QA/QC samples. If the precision goals indicated in this QAPP are not met, the data will be qualified for reporting purposes.

Completeness is defined as the percentage of measurements judged to be valid. The completeness goal is to generate a sufficient amount of valid data to meet project needs and is calculated and reported for each method, matrix, and analyte combination. Completeness describes the content of the data set once errors, if any, have been identified and qualified and the data failing to meet the DQOs have been removed from the data set, for instance those receiving an “R”-flag for unusable data. The number of valid results divided by the number of possible results, expressed as a percentage, determines the completeness of the data set. The target completeness objective for this project is 90% for all types of samples; however, the actual completeness may be different, depending on the intrinsic nature of the samples. The data set will be considered complete if at least 90% of the data collected is usable without meaningful qualifiers or errors. If the goal is not achieved, the rationale for the incompleteness will be assessed and reported. The data completeness will be evaluated during the data validation review process.

Representativeness is a qualitative term used to express the degree to which data accurately and precisely represent a characteristic of a population. It is mostly concerned with the proper design of the sampling program. Sample collection and handling methods, sample preparation, analytical procedures, holding times, and QA protocols developed for this project, and discussed in the subsequent sections of this document, have been established to ensure that the collected data are representative.

Comparability is a qualitative term used to express the confidence with which one data set can be compared to another data set. The objective for the QA/QC program is to produce data with the greatest possible degree of comparability. The number of matrices that are samples and the range of field conditions as encountered are considered in determining comparability. Data comparability will be sustained in this project through the use of defined procedures for sampling and analysis (sample collection and handling, sample preparation, and analytical procedures), reporting in standard units, normalizing results to standard conditions, and using standard and comprehensive reporting formats.

The data set will be considered comparable when USEPA or other standard methods have been used for analyses, the data set is representative and the field investigation is conducted in accordance with accepted industry standards. Laboratory analyses for soil and groundwater will be performed in accordance with prescribed USEPA protocols established in the document *Test Methods for Evaluating Solid Waste, SW-846, Update III*, dated June 1997 (USEPA 1997), or other appropriate methods as required.

1.7 Specific Training Requirements/Certification

Personnel conducting field activities will be required to have completed Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response 40-hour training with current refresher training as detailed in Title 29 CFR Part 1910.120 for general site workers. Staff records documenting compliance with OSHA requirements are kept on file at ENVIRON.

A project-specific Health and Safety Plan (HASP) which addresses accident prevention, personnel protection, and emergency response procedures has been developed for this project (ENVRION 2014c). The HASP establishes in detail the protocols necessary for protecting workers from the hazards associated with the contaminants at the Site, and other physical hazards (such as slips, trips, and falls, electrical hazards, poisonous insects and plants, temperature hazards, etc.). All field staff working at the Site must comply with the HASP.

The primary laboratory and all subcontracted laboratories will maintain current NELAC and/or Nevada certification. The ENVIRON PM will be responsible for ensuring necessary training and certification requirements are met for field operations. The Laboratory PM will be responsible for ensuring NELAC certification is maintained for the analytical laboratory.

1.8 Documents and Records

This section includes information about the requirements for laboratory data packages. Requirements for field documentation are also outlined in Section 5 (field sheets, data sheets, photographs) and Section 6 (sample labels and sample custody) of the FSP (ENVIRON 2013b).

Records that may be generated during field work include field logs and data sheets, photographic logs, sample chain-of-custody records, sample labels, 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. The QA/QC Officer, or other appropriate person designated by the ENVIRON PM, will review the field data to evaluate the completeness of the field records.

Analytical data will contain the necessary sample results and quality control data to assure compliance with the DQOs defined for the project. Laboratory data will be provided in hard copy and electronic format in accordance with this QAPP.

1.8.1 Field Notes

Field logbooks will provide the means of recording data collection activities at the time they take place. The logbooks will be bound field survey notebooks assigned to field personnel, but they will be stored with the project files in a centralized document repository at an ENVIRON office location when not in use. Activities will be described in as much detail as possible such that the activity being described can be reconstructed without reliance on memory. Entries will be made in language that is objective, factual, and free of personal opinions or terminology that might later prove unclear or ambiguous.

The cover of each logbook will be identified by the project name, project-specific document number, and the time period which the logbook describes (beginning and end dates). The title page of each logbook will have contact information for the ENVIRON Principal in Charge and PM. Entries into the logbook will contain a variety of project-specific information. At the beginning of each entry, the date, start time, weather, names of all team members present, level of personal protection being used, and the signature of the person making the entry will be entered. Names and affiliations of visitors to the site and the purpose of their visit will be recorded.

All entries will be made in ink signed and dated and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark, initialed, and dated by the user. Whenever a sample is collected or a measurement is made it shall be recorded. Any photographs taken will be identified by number and a description of the photograph will be provided. All equipment used to conduct measurements will be identified including serial number and any calibration conducted will be recorded.

1.8.2 Field Data Sheets

Field data sheets will be completed by field personnel during sample collection activities. The types of field data sheets used include groundwater sampling logs, soil boring logs, well construction logs, well development logs, and soil gas sampling logs. If deemed necessary by the PM, electronic copies of the data sheets may be produced after sampling has been completed and these can be provided in the RI report, describing sampling conducted. Example field data sheets are provided in Appendix B of the FSP.

1.8.3 Photographs

Digital photographs will be taken if necessary to supplement and verify information entered into field logbooks. For each photograph taken, the following will be recorded in the field logbook:

- Date, time, and location,
- Number and brief description of the photograph, and
- Direction in which the photograph was taken, if relevant.

If a number of photographs are taken during a task, general notes will be sufficient on the group of photographs taken, so long as the information outlined above can be inferred from the information provided for each photograph.

1.8.4 Sample Labels

Sample labels will be provided with sample containers for laboratory analysis. Each sample collected will be assigned a unique identification number. All samples will be labeled in a clear and precise way for proper identification in the field, laboratory, and progress reports. Section 2.3 provides additional detail on the sample labeling requirements for this project.

1.8.5 Chain-of-Custody Forms and Custody Seals

Completed original chain-of-custody forms will be sent with each sample shipment to document collection and shipment of samples for off-site laboratory analysis with copies to be maintained with the Site's project files. The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. A custody seal signed by the sampler will be used to maintain custodial integrity of the samples during collection and shipment to the laboratory. Section 2.3 provides additional detail on chain-of-custody and custody seal requirements for this project.

1.8.6 Verification of Electronic Data

Electronic data are generally derived from automated data acquisition systems in an analytical laboratory setting. Analytical instruments are equipped with software that performs various manipulations, identifications, and calculations of data. Software calculations are verified manually during the data validation process. Other data generated by the analytical laboratories may consist of manually recorded results. This data may be documented in a logbook and may subsequently be entered in the form of electronic files. As a part of their periodic reviews of logbooks and deliverables, the analytical laboratories will review transcriptions to ensure accuracy. Any errors encountered will trigger further auditing until no transcription errors are encountered in the audit set, up to and including 100 percent review.

Data can be reported in either hard copy form or electronic form. Screening level data are generally reported in summary form including sample identification (ID) information, results for the sample analyses, and a summary of the QC data including calibrations and verifications of precision, accuracy, and representativeness, where appropriate. For purposes of this project, laboratory deliverables equivalent to EPA Level IV will be required to support the DQOs. Approximately 90 percent of the data will be validated to NDEP Stage-2b and approximately 10 percent of data will be validated to NDEP Stage-4 by an outside consultant. Data Validation is further discussed in Section 4.

If data manipulation or reduction is performed electronically, outside of the raw data produced by purchased instrumentation, the formulae or macros employed for these purposes will be validated by comparing the results of a sample manual calculation to the result produced electronically. This validation will be documented and maintained in central files.

1.8.7 Electronic Data Deliverables (EDDs)

In addition to hard copy data reports provided by the contract laboratory, analytical data will be submitted to the ENVIRON QA/QC Officer as Electronic Data Deliverables (EDDs) in the format specified by ENVIRON. The names of analytical and preparation methods should be consistence with NDEP guidance (NDEP 2013). It is the responsibility of the analytical laboratory to ensure that the hard copy data and electronic data are identical. The data reported in EDDs and in the hard copy reports must correspond exactly, including significant digits and units. It is preferable that the hard copy and EDD are generated at approximately the same time from the same data source.

The laboratory will provide an EDD for each Sample Delivery Group (SDG). The EDD should conform to ENVIRON's Laboratory Electronic Data Deliverable Format Specification, EQuIS Edition. At the discretion of the ENVIRON PM and the database administrator, an exception may be made to accept an alternative EDD format, which must contain the following information at a minimum:

- Sample ID
- Sample Date
- Sample Time
- Laboratory Sample ID
- Analytical Method
- Analyte Name
- CAS#
- Result
- Detect Flag (y/n)
- Laboratory Qualifier
- Units
- Reporting Limit or PQL
- MDL
- Sample Adjusted MDL
- Extraction Method
- Cleanup Method
- Sample Receipt Date
- Extraction Date
- Analysis Date
- Analysis Time
- Dilution Factor
- Result Reportable (y/n)
- Batch Number
- Sample Delivery Group (SDG)

The Data Validation Contractor will compare a random percentage of electric entries with hardcopy results to check for consistency.

1.8.8 Laboratory Documentation

The following section discusses general laboratory requirements for preparing data packages. Data packages provided by contract analytical laboratories will be at USEPA Level IV. The Level IV data package includes the following information:

- Sample and client information
- Sampling time and date
- Sample number
- Analytical method
- Environmental sample results or measurements
- Reporting limits
- Chain of custody
- Sample receipt checklist
- Summary of QA/QC results
- Method blank results
- Surrogate recoveries, if applicable
- Laboratory control spike (LCS)/ Laboratory control spike duplicate (LCSD) results, recoveries, and control limits
- Matrix spike (MS)/Matrix spike duplicate (MSD) results, recoveries and control limits
- Duplicate results and Relative Percent Difference (RPD)
- Spike amount
- Raw data for samples, tunes, calibrations, internal standards, etc.
- Case narrative

The case narrative will be written and the release of data will be authorized by the laboratory director or his/her designee. Items to be included in the case narrative are the field sample ID with the corresponding laboratory ID, parameters analyzed for in each sample and the methodology used (EPA method numbers or other citation), detailed description of all problems encountered and corrective actions taken, discussion of possible reasons for results exceeding the acceptable laboratory QA/QC results, and observations regarding any occurrences which may affect sample integrity or data quality.

Legible copies of the chain of custody forms for each sample will be maintained in the data package. Cooler log-in sheets will be associated with the corresponding chain of custody form/s. Any integral laboratory tracking document will also be included.

For each environmental sample analysis, this summary shall include field ID and corresponding laboratory ID, sample matrix, collection date/time, laboratory receipt date/time, date of sample extraction (if applicable), date and time of analysis, identification of the instrument used for analysis, instrument specifications, weight or volume of sample used for analysis/extraction, dilution or concentration factor used for the sample extract, method detection limit or sample quantitation limit, definitions of any data qualifiers used, and analytical results.

The following QA/QC results will be presented in summary form. Acceptance limits for all categories of QC criteria will be provided with the data. The summary of QA/QC results for organic analyses will include, but will not be limited to the following:

- Method Blank Analyses – The concentrations of any analytes found in blanks will be reported, even if the detected amounts are less than the PQL. The samples and QA/QC analyses associated with each method blank will be stated.
- Surrogate Standard Recovery (organic analyses only) – The name and concentration of each surrogate compound added will be detailed. The percent recovery of each surrogate compound in the samples, method blanks, MS/MSD, and other QA/QC analyses will be summarized with sample IDs such that the information can be linked to sample and QA/QC analyses.
- Precision and Accuracy – For MS/MSD analyses the sample results, spiked sample results, percent recovery, and RPD associated with the associated control limits will be detailed. For laboratory duplicate analyses the RPD between duplicate analyses will be reported as applicable. For laboratory QC check and/or LCS analyses, the %R and acceptable control limits for each analyte will be reported. All batch QC information will be linked to the corresponding sample groups.
- Precision and Accuracy – For LCS/LCSD analyses the source of the sample(s), true value concentrations, found concentrations, percent recovery for each element analyzed, and the date and time of analysis will be reported.

All data packages will be reviewed by the individual laboratory QA Officer to ensure accurate documentation of any deviations from sample preparation, analysis, and/or QA/QC procedures and descriptions. Any problems identified by the laboratory QA Officer will be documented in the narrative of the report.

1.8.9 Laboratory Record Retention

Raw data will be available for further inspection, if required, and maintained in each laboratory's central job file. Records related to the analytical effort (i.e., cost information, scheduling, custody) are maintained at the laboratories in a secured location. Moreover, analytical laboratories will have the ability to archive data and quality records in a secured area protected from fire and environmental deterioration. Electronic data should be protected against exposure to magnetic or electronic sources.

All records necessary to reproduce the analytical calculations and support the reported results must be maintained for not less than 10 years. Types of records to be maintained for the project include, but are not limited to the following:

- Chain of custody forms, including: information regarding the sampler's name, date of sampling, type of sampling, sampling location and depth, number and type of sampling containers, signatures of sample custodians with transfer date and times noted, and sample receipt information including temperature and conditions upon arrival at the laboratory;
- Cooler receipt form documenting sample conditions upon arrival at the laboratory;
- Any discrepancy/deficiency report forms due to problems encountered during sampling, transportation, or analysis;
- Sample destruction authorization forms containing information on the manner of final disposal of samples upon completion of analysis;
- All laboratory notebooks including raw data readings, calibration details, QC checks, etc;
- Hard copies of data system printouts (chromatograms, mass spectra, inductively coupled plasma [ICP] data files, etc.);
- Tabulation of analytical results with supporting QC information; and
- Sample preparation documents/records.

1.8.10 Field Document Retention

All field documentation generated during the implementation of the RI/FS Work Plan, including any electronic files produced, will be kept on file in a secured central repository in an ENVIRON office in accordance with ENVIRON's document retention policy.

2.0 Data Generation and Acquisition

This section discusses sampling process design; sampling methods; sample handling and custody; analytical methods; quality control; instrument/equipment testing, inspection, maintenance, and calibration; inspection/acceptance of supplies; non-direct measurements, and data management.

2.1 Sampling Process Design

This QAPP is intended to cover soil, soil vapor, and groundwater sampling. Samples will be collected according to applicable NDEP guidelines and following the procedures described in Section 5 of the FSP (ENVIRON 2014b). The collected data will be used to fill data gaps identified in previous investigations, thereby completing delineation of the lateral and vertical extent of selected chemicals in soil, soil gas, and groundwater at the Site, as described in the RI/FS Work Plan (ENVIRON 2014a).

2.2 Sampling Methods

Sampling will be conducted in accordance with the procedures described in Section 5 of the FSP (ENVIRON 2014b).

2.3 Sample Handling and Custody Requirements

In general, the samples and subcontracted analytical laboratories will handle samples in a manner to maximize data quality. 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 in detail.

2.3.1 Sample Identification

To maintain consistency, a sample identification convention has been developed and will be followed throughout the RI/FS Work Plan. The sample identification numbers (IDs) will be entered onto the sample labels, field forms, chain-of-custody forms, logbooks, and other records documenting sampling activities.

The identification system for RI primary field samples will include the soil boring (RISB), trench (RIT), groundwater well (M for on-Site, PC for off-Site) or soil gas (RISG) well ID, trench sampling node if applicable (alpha numeric), a sample start depth if applicable (for discrete depth samples only), and the date in YYYYMMDD format. Grab groundwater samples collected from soil borings will be identified similarly to a soil sample but with “GW” in place of the depth. For example,

- A soil sample collected from a depth of 10 to 10.5 feet bgs at borehole RISB-1 on July 1, 2014 will be identified as RISB-1-10.0-20140701.

- A soil sample collected from a depth of 10 to 10.5 feet bgs at monitoring well borehole M-189 on July 1, 2014 will be identified as M-189-10.0-20140701.

- A grab groundwater sample collected from borehole RISB-1 on July 1, 2014 will be identified as RISB-1-GW-20140701.
- A trench soil sample collected from trench RIT-1, node A, at a depth of 2 to 2.5 feet bgs will be identified as RIT-1-A-2.0-20140701.
- A soil gas sample collected from a depth of 5 feet bgs in soil gas sample point RISG-1 on July 1, 2014 will be identified as RISG-1-5.0-20140701.
- A groundwater sample collected from monitoring well M-161D on July 1, 2014 will be identified as M-161D-20140701.

2.3.1.1 Field QA/QC Sample IDs

Field QA/QC samples and procedures are discussed in Section 2.5.1. The field QC sample codes that may be applied include:

- EB for Equipment Blanks
- FB for Field Blanks
- TB for Trip Blanks
- FD for Field Duplicates

Field QA/QC sample codes will be appended to the end of the primary sample ID that is represented by the field QA/QC sample.

An Equipment Blank (EB) should be named for the sample collected immediately prior to the collection of the EB.

The Field Blank (FB) and Trip Blank (TB) each represent a group of samples: a batch of twenty for the FB, and all samples within one sample cooler or other shipping container for the TB. Thus the FB and the TB should be named after the first sample of the batch (for FB) or the first sample placed in the cooler or shipping container (for TB).

The Field Duplicate (FD) represents the primary sample that is being duplicated, thus the FD should be named after the corresponding primary sample.

For example, the first soil sample to be placed in a cooler is RISB-1-10.0-20140701. The sample is to be analyzed for VOCs, and a duplicate sample is collected. A TB is placed in the cooler with the sample, and an EB is collected immediately following the collection of the soil sample (after decontamination of sampling equipment). The associated field QA/QC samples will be identified as:

- RISB-1-10.0-20140701-EB *(Equipment Blank)*
- RISB-1-10.0-20140701-FB *(Field Blank)*
- RISB-1-10.0-20140701-TB *(Trip Blank)*

- RISB-1-10.0-20140701-FD *(Field Duplicate)*

- Field QA/QC samples and the frequencies of collection are summarized in Table 6.

2.3.2 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 or Site name (“NERT”) 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 sampler
- 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. All corrections will be dated and initialed.

2.3.3 Containers, Preservation, and Hold Time

The analytical methods, type of sample containers to be used for each sample type and analysis, preservation requirements for all samples, and holding times are provided in Table 7.

Each lot of preservative and sampling containers will be certified as contaminant-free by the provider and/or the laboratory. The laboratories will maintain certification documentation in their files. 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.

Soil and groundwater sample containers will be placed in airtight plastic bags, if possible, and refrigerated or placed in a cooler with ice to chill and maintain a sample temperature of 4˚ (± 2) C.

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 holding time.

Certain soil samples will be submitted on hold (“contingent samples”) with instructions for extraction at a later date, or pending analytical results of a corresponding sample submitted for initial analysis.

The laboratory will immediately notify the ENVIRON PM and QA/QC Officer in the event that the analysis or reporting of results for initial soil samples may be delayed beyond the acceptable hold time of corresponding contingent sample(s). In such a scenario, the affected contingent sample(s) will be extracted in order to extend the acceptable hold time. Once the results of the initial soil samples are available, the ENVIRON PM and/or QA/QC Officer will decide whether the extractions of the corresponding contingent samples should be analyzed.

2.3.4 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 by the sampling crew and recorded in the field logbook and field data sheets. Field guidance documents within Appendix A of the FSP (ENVIRON 2014b) provide detailed information on groundwater and soil sampling and handling procedures. Samples for laboratory analysis will be transferred immediately to appropriate laboratory supplied containers in accordance with the following sample handling protocols:

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 by the sampling crew and recorded in the field logbook and field data sheets. 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 in accordance with Section 2.3.2.
- Groundwater and soil 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 and cooled to 4 °C or lower for transport to the laboratory.
- Summa canisters used for soil gas collection do not require cooling or additional bagging.
- All sample lids will stay with the original containers, and will not be mixed.
- Sample bottles or canisters will be wrapped in bubble wrap as necessary to minimize the potential for breakage or damage 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.

The samplers are responsible for proper handling practices until receipt at the laboratory, or by the courier, at which time the Laboratory Project Manager assumes responsibility of the samples through analysis and ultimately to the appropriate disposal of samples. Sample handling procedures specific to the laboratory are described in the individual laboratory QA Manuals.

2.3.5 Sample Custody

Standard sample custody procedures will be used to maintain and document sample integrity during collection, transportation, storage, and analysis. Custody documents must be written in waterproof, permanent ink. Documents will be corrected by drawing one line through the incorrect entry, entering the correct information, and initialing and dating the correction. The ENVIRON PM is responsible for proper custody practices so that possession and handling of individual samples can be traced from the time of collection until receipt at the laboratory, or by the courier. The Laboratory PM is responsible for establishing and implementing a control system for the samples in their possession that allows tracing from receipt of samples to disposal.

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 sampler 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 Project Manager 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 chain-of-custody 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 chain-of-custody form 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 chain-of-custody form that will be available upon request. Chain-of-custody forms will be maintained in the project file by ENVIRON and at the analytical laboratory.

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 whether or not the custody seals are intact.

2.3.5.1 Shipping Procedures

If shipping samples using a commercial courier is necessary, each container sent will have a separate chain-of-custody form. Samples collected during the investigation will be identified as environmental samples. Samples will be packed in the same manner as when being transported from the sampler to the laboratory, with the following changes:

- Dry ice is not allowed to be used to chill samples requiring commercial shipment.
- Extra packing material will be used to fill the coolers in order to limit movement within the container.
- Ice should be contained in zip-closure bags and the cooler should be lined with plastic as described below.
- Coolers containing ice and/or liquid samples should be lined with a plastic bag (such as a contractor garbage bag) to limit the potential for leaks in the event of ice bags leaking or sample container breakage. All necessary precautions must be taken to prevent any liquids leaking from sample coolers while in transit.
- Coolers will be closed and taped shut. If the cooler has a drain, it too will be closed and taped shut to prevent leaks.

- A minimum of two custody seals will be affixed to the front and side openings of the cooler so that the cooler cannot be opened without breaking a seal. The seals will be covered with wide clear tape so that the seals do not accidentally break in transit.

- Non-perishable samples collected on the weekend may be held for more than three days if there is no threat of exceeding hold times. If the samples require being chilled and maintained at a cool temperature, they will be stored under refrigeration and shipped the following work day.

2.3.5.2 Transport container receipt

Upon receipt of the transport container, the analytical laboratories will review the contents and sign and date the chain-of-custody forms. Additional information will also be added to the chain-of-custody form including: the status of the custody seals; the temperature of the cooler, how it was evaluated, and whether or not the samples were on ice; the conditions of samples and identification of any broken sample containers; description of any discrepancies on the chain-of-custody forms; sample labels and/or requested analyses; and the pH of any preserved water samples.

The analytical laboratory will contact the ENVIRON Analytical Task Leader or other designated person regarding any discrepancies in paperwork and/or chemical or thermal sample preservation. Nonconformance and corrective actions will be documented in accordance with the laboratories QA/QC documents. After samples have been accepted, checked, and logged in, the laboratories will maintain them in a manner consistent with the custody and security requirements specified in the laboratory QA/QC documents.

2.4 Analytical Methods

Both field measurement methods and stationary analytical laboratory methods will be utilized to analyze samples during implementation of this QAPP. Analytical methods including MDLs and PQLs to be used are listed on Tables 2 through 5. Laboratory SOPs for the listed methods have been developed and approved by the laboratories performing the analyses. The dates of the current SOPs are summarized for each laboratory on Table 1.

2.4.1 Field Measurement Methods

Samplers may conduct in-field measurement for depth to water; pH, conductivity, ferrous iron, sulfide, dissolved oxygen (DO), oxygen reduction potential (ORP), turbidity and temperature of groundwater samples; field screening of organic vapors in soil samples; and field screening for leak detection compounds in soil vapor samples. An appropriate pH meter and standardization buffers as recommended by the instrument manufacturer will be used. All meter standardizations, QC, and sample results will be recorded on the appropriate field forms.

2.4.2 Laboratory Analytical Methods

The project will involve, at a minimum, the analysis of soil, soil vapor, and groundwater samples. The primary methods that will be used to analyze samples are summarized in Table 2 through 5.

Each analytical laboratory used during implementation of this QAPP will be expected to provide a current statement of Qualifications and laboratory QA/QC documents (including Quality Assurance Manual [QAM] and SOPs) for review by the QA/QC Manager. In addition, analytical laboratories may be requested to provide current MDL studies, proposed RLs and other sources that contain QC procedures, QC acceptance criteria, and corresponding corrective actions for the analytical methods to be used during implementation of the QAPP.

The laboratory will use analytical methods and QA/QC procedures in conformance with approved methods for all samples. Copies of the laboratory QA Manuals and SOPs for all laboratories will be retained on file with ENVIRON. Table 1 provides the specific analytical method to be used for each analyte and matrix. In the event that the listed procedures cannot be performed, the laboratory will notify the ENVIRON Analytical Task Leader of the conflict. The ENVIRON Task Leader or PM will notify the NDEP RPM for resolution. Unless specifically directed otherwise by the NDEP RPM, the standard or superseding test methods will govern. No changes in prescribed analytical methods will be made unless approved by the NDEP RPM.

PQLs compiled in Tables 2 through 5 are from a review of RLs generally achieved by the laboratories used for implementation of this QAPP. It should be noted that the limits listed in Tables 2 through 5 are laboratory and sample dependent and may not always be achievable due to matrix effects, necessary dilution of the sample, and/or interferences.

2.5 Quality Control Requirements

There is potential variability in any sample collection, analysis, or measurement activity. 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. This section identifies quality control checks for sample collection, field measurements, and laboratory analyses for data collected during implementation of the RI/FS Work Plan.

2.5.1 Field QC Procedures

Field QA/QC samples that will be collected during the proposed investigation include field duplicate samples, field blanks, and equipment blanks. The description and purpose of these samples is discussed in this section. The frequency of analysis of field QA/QC samples is summarized in Table 6.

2.5.1.1 Field Duplicates

The FD is a replicate sample collected as close as possible to the same time that the primary sample is collected and from the same location, depth, or source, and is used to document analytical precision. FD samples will be labeled and packaged in the same manner as primary samples but with “FD” appended to the sample ID. FDs will be collected at a frequency of one in every 10 primary samples and will be analyzed for the same suite of parameters as the primary sample. The relative percent difference (RPD) between the field duplicate sample and the primary sample is evaluated to assess the homogeneity of the sample matrix and to assess the reproducibility of laboratory and field sample collection techniques.

2.5.1.2 Field Blanks

FB samples are used to assess the presence of contaminants arising from field sampling procedures. FB samples are obtained by filling a clean sampling container with reagent-grade deionized (DI) water, in the field at a sample location. The sample then is analyzed in the same manner as the primary sample. FB samples will be collected at a frequency of one in every 20 samples and will be analyzed for the same suite of parameters as the primary sample to assess potential background contamination or errors in the sampling process.

2.5.1.3 Equipment Blanks

EB samples are used to assess the effectiveness of decontamination procedures. EB samples are obtained by filling decontaminated sampling equipment with reagent-grade DI water, sampling this water, and submitting the sample for analysis. Alternatively, DI water can be poured over or through the decontaminated sampling equipment and then collected and submitted for analysis. EBs will be collected at a frequency of one in every 20 samples and will be analyzed for the same suite of parameters as the primary sample to assess the effectiveness of decontamination procedures.

2.5.1.4 Trip Blanks

TB samples are used to assess the potential for cross-contamination of VOCs between samples during storage and shipment. TB samples are only necessary when VOCs are being analyzed in soil, groundwater, and/or soil gas samples. A TB sample consists of one or more sample containers that are prepared at the analytical laboratory by filling with reagent-grade DI water (or, for soil gas sampling, VOC-free air). The TB sample is added to the sample cooler or other shipping container as soon as the first primary sample is collected. The TB sample accompanies the primary samples to the laboratory and is analyzed using the same analytical method as the primary samples.

2.5.2 Laboratory QC Procedures

The laboratory QA/QC program includes (i) performing analytical methods according to prescribed protocols and (ii) analyzing laboratory QA/QC samples to measure precision and accuracy of laboratory methods and equipment, instrument calibration and preventive maintenance. Laboratory QA/QC samples and parameters that will be analyzed during the implementation of the RI/FS Work Plan include method blanks, laboratory control samples, matrix spikes, laboratory duplicates, and surrogates. The acceptable limits of the laboratory QA/QC samples are provided in Tables 2 through 5. The frequency of analysis of laboratory QA/QC samples is summarized in Table 6.

2.5.2.1 Method Blanks

A method blank is a sample of deionized, distilled water prepared by and analyzed by the laboratory. It is used to assess potential contamination in the laboratory process (e.g., contaminated reagents, improperly cleaned or calibrated equipment). The laboratory will analyze one method blank sample per 20 primary field samples, or 5% of the primary field samples, for each analytical method.

2.5.2.2 Laboratory Control Samples

A laboratory control sample is a known matrix (e.g., washed sea sand, reagent water, zero air) that has been spiked with a known concentration of specific target analytes. It is used to demonstrate the accuracy of the analytical process. A laboratory control sample will be analyzed once per 20 primary field samples, or 5% of the primary field samples, for each analytical method.

2.5.2.3 Matrix Spikes and Blank Spikes

Matrix spikes are performed by the analytical laboratory in order to evaluate the efficiency of the sample extraction and analysis procedures. Matrix spike samples are necessary because matrix interference (i.e., interference from the sample matrix -water or soil) may have a widely varying impact on the accuracy and precision of the extraction analysis. The matrix spike is prepared by the addition of known quantities of specific target compounds to a sample. The sample then is extracted and analyzed. The results of the analysis are compared with the known additions and a matrix spike recovery is calculated giving an evaluation of the accuracy of the extraction and analysis procedures. Typically, matrix spikes are performed in duplicate in order to evaluate the precision of the procedures as well as the accuracy. Matrix spike recoveries (%R) are reviewed to check that they are within acceptable range. Matrix spikes and matrix spike duplicates will be analyzed by the laboratory at a frequency of at least 1 per 20 primary field samples, or 5% of the primary field samples, for applicable analytical methods.

2.5.2.4 Laboratory Duplicates

Duplicate samples are used to assess precision in the analytical method. An additional aliquot is extracted from the primary sample and analyzed using the identical procedures as the primary sample. Then the results are compared to assess the precision. There are two types of duplicates – laboratory control sample duplicates and matrix spike duplicates. Duplicates will be collected and analyzed in accordance the laboratory QA Manuals at a frequency of at least 1 per 20 primary field samples, or 5% of the primary field samples, for applicable analytical methods.

2.5.2.5 Surrogates

A surrogate is an analyte isomer compound spiked into each sample analyzed. Surrogates assess the precision and accuracy of each individual analysis based on the surrogate recoveries. A surrogate (typically more than one) will be analyzed for each primary sample when applicable to the specified method. Surrogate recovery should fall within the limits set by the laboratory in accordance with procedures specified by the method.

2.5.3 Corrective Actions

Corrective actions may be initiated if precision or accuracy goals are not achieved. The initial step in corrective action will be to instruct the laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous results. At the same time, sample collection and handling procedures will be reviewed to assess whether they could have contributed to the anomalous results. Based on this evaluation, the ENVIRON PM or Analytical Task Leader, together with the Project QA Officer, will assess whether re-analysis or re-sampling is required or whether any protocol should be modified for future sampling events.

Any changes in laboratory methods, or quality assurance parameters or limits, require written approval by ENVIRON prior to implementation by the laboratory.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

2.6.1 Field Instrumentation

Equipment used in the collection of field measurements will be maintained according to the manufacturer's specifications, and will be inspected and calibrated prior to use. Field equipment requiring testing, inspection, and maintenance are:

- Organic Vapor Meter (OVM) utilized for measuring total organic vapors in soil and breathing zones;
- Particulate Meter (PM) utilized for measuring particulate matter in breathing zones and air column
- Water quality meter utilized to measure pH, temperature, and conductivity;
- A flow through cell to measure DO and ORP of certain water samples
- Turbidity meter utilized to measure turbidity of water samples;
- Electric water level meter utilized to measure depth to groundwater;
- Low flow adjustable sampling pump utilized for collection of groundwater, and
- Pressure transducers for water level/temperature monitoring and data logging.

The operating manuals for each piece of field equipment used describe the procedures required for testing, inspecting, and maintaining this equipment. The types and frequencies of testing, calibration, and maintenance for field instruments are presented in Table 8. The results of testing, inspections, or maintenance conducted will be summarized in the field logbook. Testing, inspection, and maintenance of field equipment and documentation of completion of these activities will be the responsibility of field personnel under the direction of the Field Task Leader.

2.6.2 Laboratory Equipment

Instrument maintenance logbooks are maintained in the laboratory. In general, the logbooks contain a schedule of maintenance, as well as a complete history of past maintenance, both routine and non-routine, for that particular instrument.

Preventive maintenance is performed according to the procedures specified in the manufacturer's instrument manuals, including lubrication, source cleaning, and detector cleaning, and the frequency of such maintenance. Chromatographic carrier gas purification traps, injector liners, and injector septa are cleaned or replaced on a regular basis. Precision and accuracy data are examined for trends and excursion beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to degrade as evidenced by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the pre-determined QC criteria.

2.7 Instrument Calibration and Frequency

2.7.1 Field Calibration Procedures

Instruments requiring calibration include air monitoring equipment (e.g., PIDs, gas multimeters, and dust monitoring meters) and water quality meters (e.g., pH, dissolved oxygen, specific conductivity, and turbidity meters). 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 or in the field logbook. 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. Calibration and maintenance procedures for field equipment are detailed in Table 8.

2.7.2 Laboratory Calibration Procedures

The laboratory SOPs and QAMs address the calibration and frequency of calibration required for laboratory instruments as well as a description of documentation that will be completed. Laboratory QAMs are located in Appendix A. Laboratory SOPs are located in Appendix B. Table 9 summarizes the minimum frequency and scope of laboratory checks and calibrations to be performed during this project. Laboratories may have more stringent requirements as part of their SOPs, but must meet these minimum requirements as well as satisfying specific requirements of the standard methods specified for this project.

The Laboratory PM will be responsible for ensuring proper calibration and recordkeeping are conducted and will inform the ENVIRON Analytical Task Leader of any issues that may impact analytical results.

2.8 Inspection/Acceptance of Supplies and Consumables

Inspection will be conducted of field and laboratory supplies and consumables that may directly or indirectly affect the quality of results. Only supplies and consumables that have been determined to be acceptable will be utilized for the project.

Containers and individually certified Summa™ canisters will be provided by the laboratory or their approved supplier for samples to be analyzed by the laboratory. The analytical sample containers will be considered critical field supplies and consumables and the laboratory will provide an inventory describing the number and types of containers and/or canisters that have been provided. An inventory of containers received for each sampling event will be conducted by the field personnel and only new undamaged containers or canister will be utilized. If any container is found to have a defect or damage it will be properly discarded and replacements will be requested as necessary. Canister gauges will be checked to ensure that vacuum conditions exist within the canister.

Other field supplies and consumables to be used include items such as bailer cord, items related to perchlorate sterile filtering[1] (e.g. sterile 20-millileter (mL) syringes, sterile surfactant

[1] Per NDEP guidance (2010), groundwater samples analyzed for perchlorate must be sterile filtered at time of collection.

free cellulose acetate 0.2 micrometer (µm) filters, and sterile sample containers) calibration standards, disposable bladders for pumping, sample tubing, and distilled water. These supplies will be inspected upon receipt in part to verify they are new and in their original packaging. If any defects are noted or suspected they will be properly discarded and replaced prior to use.

The supplies and consumables for this project will be handled and stored in such a manner such that they will not compromise sampling results. This will involve keeping items in their original containers before use, sealing containers properly between uses, or storing items in new or dedicated plastic bags.

The ENVIRON Field Task Leader with assistance from field personnel will be responsible for inspecting and accepting field supplies and consumables and providing replacements as necessary. Field personnel will inventory critical supplies on a regular basis and report to the ENVIRON Field Task Leader to ensure that work will not be delayed unnecessarily. The ENVIRON Field Task Leader will in turn provide updates on a regular basis to the ENVIRON PM.

2.8.1 Laboratory Supplies and Consumables

A detailed description of the laboratory inspection and acceptance policy for supplies and consumables is provided in the laboratory QA Manual. A list of primary supplies and consumables necessary for each laboratory analysis are provided in the individual SOPs.

The Laboratory PM will be responsible for ensuring supplies and consumables are inspected as described in their QA Manual and will inform the ENVIRON Analytical Task Leader of any issues that may impact analytical results.

2.9 Non-Direct Measurements

The historic data were generated as part of previous investigations at the Site. This data was evaluated during development of the RI/FS Work Plan, ISRACR, and Annual Groundwater Monitoring Reports and has been used to inform the FSP.

The sampling and analysis as described in the RI/FS Work Plan and in this QAPP has been designed to generate data that will be comparable to the historic data and add to the Conceptual Site Model (CSM) developed for the Site.

2.10 Data Management

Data for this project will be generated in one of two ways; on-site from sampling and measurement activities and at the laboratory via analytical testing of soil, soil vapor, and groundwater samples. An overview of the management and reporting of this data is described in the following sections. Detailed requirements for the recording of field data and reporting of analytical data is included in Section 1.8 of this QAPP.

2.10.1 Field Data

Data that may be collected in the field primarily consist of; field-measured water quality parameters (pH, conductance, temperature), depth to groundwater measurements, sample depth measurements, and information and measurements of the location of borings.

Upon generation all field data will be immediately recorded in site-dedicated field logbooks. Calibration results will also be included in field logbooks and/or appropriate field forms. As necessary, field data from logbooks and field forms will be tabulated in spreadsheets to be included in reports. The ENVIRON QA/QC Officer, or other appropriate person designated by the ENVIRON Field Task Leader will review the field data to evaluate the completeness and accuracy of the field records.

2.10.2 Laboratory Data

A detailed description of laboratory data management procedures is provided in the laboratory QA Manuals. The Laboratory PM will be responsible for ensuring the established data management procedures are followed.

2.10.3 Data Management

The data will be entered into an EQuIS® database system maintained by ENVIRON. 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.

EDDs provided by the laboratories should be in the EQuIS 4-File EDD format as defined by the ENVIRON Laboratory Electronic Data Deliverable Format Specification, EQuIS Edition. The EDD Format Specification is defined in Appendix C. The laboratories will check that their EDD submittals are consistent with lists of valid values provided by ENVIRON. Prior to loading into the database, EDDs will be reviewed for consistency with the file format and valid values. Data collected in the field will also be entered into the database and integrated with laboratory data.

The data validator will provide an EDD with data qualifiers, reason codes, and validation level columns appended to the data results. The validation data will be applied to the results records in the EQuIS® database.

Upon completion of data validation, an Access database consistent with NDEP specifications provided in Guidance on Unified Chemical Electronic Data Deliverable Format (NDEP 2013) will be created.

3.0 Assessment and Oversight

Assessment and oversight are designed to determine whether the QAPP is being implemented as approved, to increase confidence in the information obtained, and ultimately, to determine whether the information may be used for its intended purpose(s).

3.1 Assessment and Response Actions

3.1.1 Field Assessments and Response Actions

During the performance of the RI/FS Work Plan, the ENVIRON Project QA Officer, or other person designated by the ENVIRON PM, will perform periodic assessments of compliance with the QAPP. When problems or issues are identified, the field personnel will be notified of the issue and instructed as to how to proceed going forward. If a subsequent assessment reveals that the problem has not been corrected, a field audit will be conducted. In addition, periodic unannounced audits may be conducted of field operations. Such audits may include evaluation of the following actions: field procedures, sampling activities, field forms and logbooks, chain-of-custody procedures, field measurements, field equipment calibration procedures, and sample packaging and shipment. Additional routine audits may be conducted during the course of the RI/FS Work Plan as deemed necessary by the ENVIRON QA Officer to verify conformance with corrective actions identified in a previous audit and/or to provide additional qualitative assessment of field procedures. The ENVIRON Field Task Leader, in consultation with the ENVIRON PM; will be responsible for ensuring corrective actions identified by the audit are completed.

3.1.2 Laboratory Assessments and Response Actions

The laboratory will be responsible for its own compliance with the QAPP. If an internal audit identifies a nonconformance that affects analytical results for this project then the Laboratory PM will notify the ENVIRON Analytical Task Leader in writing describing the nonconformance, the impact to analytical results, and corrective actions implemented to respond to the nonconformance.

During the data validation process, ENVIRON will review selected elements of the laboratory performance as it relates to the QAPP. If non-compliance issues are identified, the laboratory will be notified as to what issue(s) has been identified and will be required to prepare a written response to ENVIRON regarding what corrective action will be taken to address the issue. If non-compliance problems persist, audits and/or further performance evaluation may be implemented.

3.2 Descriptions of Audits

Internal audits will be performed to review and evaluate the adequacy of the QAPP and to ascertain that it is being implemented.

A systems audit will include an evaluation of field and laboratory QA/QC procedures. If the systems audit shows a significant discrepancy from the RI/FS Work Plan or the QAPP, the responsible party will remedy the situation before work continues. Each major system change will require a written summary to document the change made.

A performance audit will include a careful evaluation of field, laboratory, and data documentation and management procedures to determine accuracy. Upon discovery of significant deviation from the QAPP, the nature and extent of the deviation will be recorded. Corrective action will be taken to remedy the deviation as necessary.

The ENVIRON Project QA/QC Officer has the responsibility of performing audits as deemed necessary and upon learning of any nonconformance. The ENVIRON PM may request an audit at any time. The ENVIRON PM and ENVIRON Task Leader(s) have ultimate responsibility for implementing corrective actions.

3.3 Reports to Management

Upon completion of any audit, the ENVIRON Project QA/QC Officer will document and report the QA/QC results and the identified issues (i.e., laboratory and/or field) to the ENVIRON Task Leader(s). The ENVIRON Task Leader(s) will evaluate the impact of the QA/QC issues and determine if the deviations will result in an adverse effect on the project conclusions. If it is determined that corrective actions are necessary, procedures outlined in Section 2.5.3 will be implemented.

4.0 Data Validation and Usability

4.1 Data Review, Validation, and Verification Requirements

Data generated during performance of the RI/FS will undergo two levels of review and validation, one at the laboratory, and a second review after the data are received by ENVIRON. The second data validation review will be performed by ENVIRON and their designated independent data validation contractor, LDC and Neptune.

4.2 Validation and Verification Methods

4.2.1 Procedures Used to Validate Field Data

Procedures to evaluate field data include checking for transcription errors and review of field logbooks at the time of data collection. Field sampling efforts as described in the field logbooks will be reviewed at the conclusion of each sampling event to confirm sampling procedures followed established procedures. If any significant nonconformance issues are noted they will be reported with a description of the potential effect of the nonconformance to the data. This task will be the responsibility of the ENVIRON Field Task Leader, or designee.

4.2.2 Procedures Used to Validate Laboratory Data

Initial data reduction, validation, and reporting will be performed by the laboratory as described in laboratory QAMs (Appendix A) and SOPs (Appendix B). Secondary, independent validation will be performed by ENVIRON and LDC.

The laboratory will perform in-house analytical data validation under the direction of their own QA Officer and the Laboratory PM. 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 Laboratory QA Officer at the direction of the Laboratory PM will routinely audit preliminary reports and will decide if sample re-analysis is required. This data assessment will be based on the assumption that the sample was properly collected and handled. Per NDEP guidance (2007), cation-anion balance calculations must be performed on groundwater samples prior to submission to clients in order in ensure the anion-cation balance is within the limits of Standard Methods Section 1030E.

The Laboratory QA Officer will conduct a systematic review of the data for compliance with the established quality control criteria based on spike, duplicate and blank results and an evaluation of data precision, accuracy, and completeness will be performed.

4.3 Reconciliation with Data Quality Objectives

Analytical results obtained from the project will be reconciled with the requirements specified in this QAPP. Data validation and usability includes the final project checks to evaluate if the data obtained will conform to the project’s objectives, and to estimate what the effect is if the deviations occur. Assessment of data for precision, accuracy, and completeness will be performed according to the following quantitative definitions.

4.3.1 Precision

If calculated from duplicate measurements:

$$RPD = \frac{(C_1 - C_2) * 100}{(C_1 + C_2)/2}$$

where:

RPD	=	relative percent difference
C_1	=	larger of the two observed values
C_2	=	smaller of the two observed values

If calculated from three or more replicates, use relative standard (RSD) rather than RPD:

$$RSD = (s/\bar{y})100$$

RPD	=	relative standard deviation
s	=	standard deviation
$\bar{y}$	=	mean of replicate analyses

Standard deviation is defined as follows:

$$s = \sqrt{\sum_{i=1}^{n} \frac{(y_i / y)^{-2}}{n-1}}$$

s	=	standard deviation
y_i	=	measured value of the i[th] replicate
y	=	mean of replicate analyses
n	=	number of replicates

4.3.2 Accuracy

For measurements where matrix spikes are used:

$$\%R = 100 \left[\frac{S - U}{C_{sa}} \right]$$

$\%R$	=	percent recovery
S	=	measured concentration in spiked aliquot
U	=	measured concentration in unspiked aliquot
C_{sa}	=	actual concentration of spike added

For situation where a standard reference material (SRM) is used instead of or in addition to matrix spike:

$$\%R = 100 \left[\frac{C_m}{C_{sm}} \right]$$

$\%R$	=	percent recovery
C_m	=	measured concentration of SRM

C_{sm} = actual concentration of SRM

4.3.3 Completeness (Statistical)

Defined as follows for all measurements:

$$\%C = 100\left[\frac{V}{T}\right]$$

$\%C$ = percent completeness
V = number of measurements judged valid
T = total number of measurements

4.4 Data Submittals to NDEP

4.4.1 Data Validation Summary Report

After the data validation process is complete, a data validation summary report (DVSR) will be prepared. The DVSR will summarize the data reviewed, any nonconformances, and validation actions. Data qualifiers will be added based on this evaluation. The data qualifiers and reason codes may be modified on a project-specific basis, but will be consistent with the EPA guidelines. The DVSR will include tables of all qualified data, the reason for qualification, any DQOs not met, the value of the exceedance, and the criteria exceeded will be provided, per NDEP specifications (NDEP 2013; NDEP 2009c).

4.4.2 Electronic Data Deliverable

Following data validation, the EQuIS database will be used to create an Access database consistent with current NDEP guidance (2013).

4.5 Reconciliation With Data User Requirements

ENVIRON will review the laboratory data and their validation results to determine if it is suitable to meet the objectives of the RI/FS Work Plan. Project results that do not meet DQOs will be reviewed by the ENVIRON Project QA Officer. Raw analytical data, laboratory notebooks, or other laboratory data may be obtained and examined as necessary. Corrective actions will begin with identifying the source of the problem. Potential problem sources may include failure to adhere to method procedures, improper data reduction, equipment malfunctions, or systemic contamination.

The first level of responsibility for identifying problems and initiating corrective action will be with the sampler or field personnel under the supervision of the ENVIRON Field Task Leader. The second level of responsibility will be with any person reviewing the data including the ENVIRON Project QA Officer and /or ENVIRON Analytical Task Leader.

If critical data are found to not meet quality control objectives the ENVIRON Analytical Task Leader will take appropriate action to obtain acceptable data as determined necessary. This may include re-analyzing existing samples, collecting new investigative samples, or other actions that will result in obtaining acceptable data. The specific course of action will be determined on a case-by-case basis based in part on the effect the nonconformance may have on the RI/FS objectives.

Data that provide useful information but are not critical for achieving RI/FS objectives will be appropriately documented if they do not meet quality control objectives. However, resampling or re-analysis to address such data will typically will not be necessary.

Other corrective actions may include more intensive training, equipment repair followed by a more intensive preventive maintenance program, or removal of the source of systemic problems. Any and all corrective actions will be reviewed by the ENVIRON Task Leader(s) for certainty that resolution was achieved. Once resolved, the corrective action procedure will be fully documented.

5.0 References

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Tables

TABLE 1. ANALYTICAL METHODS AND LABORATORIES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	MATRIX	ANALYTICAL METHOD	ANALYTICAL LABORATORY	SOPs REVIEW DATE[1]
Volatile Organic Compounds (VOCs) [2]	Water	EPA Method 8260B	TestAmerica (Irvine, CA)	November 4, 2013
	Soil	EPA Method 8260B		November 4, 2013
	Air	EPA Method TO-15	McCampbell Analytical (Pittsburg, CA)	December 16, 2013
	Air	EPA Method SW8260B		November 4, 2013
Semivolatile Organic Compounds (SVOCs)	Water	EPA Method 625	TestAmerica (Irvine, CA)	November 18, 2013
	Soil	EPA Method 8270C		November 18, 2013
Organic Acids	Water	Organic Acid Analysis	Alpha Analytical (Sparks, NV)	May, 2013
	Soil	Organic Acid Analysis		May, 2013
Organochlorine Pesticides	Water	EPA Method 608	TestAmerica (Irvine, CA)	February 28, 2013
	Soil	EPA Method 8081A		February 28, 2013
Organophosphorus Pesticides	Water	EPA Method 8141A	TestAmerica (Denver, CO)	July 15, 2013
	Soil	EPA Method 8141A		July 15, 2013
PCBs as Aroclors	Soil	EPA Method 8082	TestAmerica (Irvine, CA)	August 5, 2013
PCBs as Congener	Soil	EPA Method 1668A	TestAmerica (Sacramento, CA)	May 10, 2013
Dioxins/Furans	Soil	EPA Method 8290	TestAmerica (Sacramento, CA)	April 19, 2013
Gasoline Range Organics (GROs)	Soil	EPA Method 8015B	TestAmerica (Irvine, CA)	August 27, 2012
Diesel/Oil Range Organics (DROs/OROs)	Soil	EPA Method 8015B	TestAmerica (Irvine, CA)	October 31, 2012
Metals[3]	Water	EPA Method 200.7 / 6010B	TestAmerica (Irvine, CA)	May 17, 2013
	Soil	EPA Method 200.7 / 6010B		May 17, 2013
Metals[4]	Water	EPA Method 200.8 / 6020	TestAmerica (Irvine, CA)	August 30, 2013
	Soil	EPA Method 200.8 / 6020		August 30, 2013
Rare Earth Metals[5]	Soil	EPA Method 6020A	TestAmerica (St. Louis, MO)	August 27, 2013
Mercury	Soil	EPA Method 7471A	TestAmerica (Irvine, CA)	June 21, 2013
Hexavalent Chromium	Water	EPA Method 7199	TestAmerica (Irvine, CA)	September 9, 2013
	Soil	EPA Method 7199		September 9, 2013

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ANALYTES	MATRIX	ANALYTICAL METHOD	ANALYTICAL LABORATORY	SOPs REVIEW DATE[1]
Alkalinity and Carbonate	Soil	SM 2320B	TestAmerica (Irvine, CA)	October 14, 2013
Ammonia	Water	SM 4500-NH_3 D	TestAmerica (Irvine, CA)	August 30, 2013
	Soil	SM 4500-NH_3 D		August 30, 2013
Inorganic Anions[6]	Water	EPA Method 300.0	TestAmerican (Irvine, CA)	September 27, 2013
	Soil	EPA Method 300.0		September 27, 2013
Chlorate	Water	EPA Method 300.1	TestAmerican (Irvine, CA)	September 30, 2013
	Soil	EPA Method 300.1		September 30, 2013
Cyanide	Water	EPA Method 9014B	TestAmerica (Irvine, CA)	June 21, 2013
	Soil	EPA Method 9014B		June 21, 2013
Formaldehyde	Soil	EPA Method 8315A	TestAmerica (Irvine, CA)	October 29, 2013
Phosphorus	Water	EPA Method 365.3	TestAmerica (Irvine, CA)	September 7, 2013
Perchlorate	Water	Sterile Filtered[6] EPA Method 314.0	TestAmerica (Irvine, CA)	October 2, 2013
	Soil	EPA Method 314.0		October 2, 2013
pH	Soil	EPA Method 9045C	TestAmerica (Irvine, CA)	December 2, 2013
Specific Conductance	Water	EPA Method 120.1 / SM 2510B	TestAmerica (Irvine, CA)	September 3, 2013
	Soil	EPA Method 120.1 / SM 2510B		September 3, 2013
Total Dissolved Solids (TDS)	Water	SM 2540C	TestAmerica (Irvine, CA)	September 30, 2013
	Soil	SM 2540C		September 30, 2013
Total Suspended Solids (TSS)	Soil	SM 2540D	TestAmerica (Irvine, CA)	December 6, 2013
Total Organic Carbon	Soil	EPA Method 9060A / SM 5310B	TestAmerica (Irvine, CA)	September 17, 2013
Surfactants	Soil	SM 5540C	TestAmerica (Irvine, CA)	October 31, 2012
Radium 226	Water	EPA Method 903.0	TestAmerica (Richland, WA)	March 1, 2013
	Soil	DOE EML HASL 300 (gamma spectorscopy)		January 11, 2013

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Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	MATRIX	ANALYTICAL METHOD	ANALYTICAL LABORATORY	SOPs REVIEW DATE(1)
Radium 228	Water	EPA Method 904.0	TestAmerica (Richland, WA)	March 1, 2013
	Soil	DOE EML HASL 300 (gamma spectorscopy)		January 11, 2013
Thorium 228, 230, 232	Water	DOE EML HASL 300 (alpha spectroscopy)	TestAmerica (Richland, WA)	January 11, 2013
	Soil	DOE EML HASL 300 modified (alpha spectroscopy)		January 11, 2013
Thorium 234	Water	EPA 901.1 (gamma spectroscopy)	TestAmerica (Richland, WA)	January 11, 2013
	Soil	DOE EML HASL 300 (gamma spectorscopy)		January 11, 2013
Total Uranium	Water	ASTM D5174 / KPA	TestAmerica (Richland, WA)	August 30, 2012
	Soil	ASTM D5174 / KPA		August 30, 2012
Uranium 234, 235, 238	Water	DOE EML HASL 300 modified (alpha spectroscopy)	TestAmerica (Richland, WA)	January 11, 2013
	Soil	DOE EML HASL 300 modified (alpha spectorscopy)		January 11, 2013
Asbestos	Soil	EPA Method 600/R-93/116 modified per Berman & Kolk (2000)	EMSL Analytical (San Leandro, CA)	June 11, 2010
Sample specific parameters defined in project workplans	TCLP	EPA Method 1311 and 1312	TestAmerica (Irvine, CA)	October 31, 2013

Notes:

ASTM = American Society for Testing and Materials
DOE = Department of Energy
HASL = Health and Safety Laboratory
EML = Environmental Measurements Laboratory
EPA = United States Environmental Protection Agency
KPA = Kinetic Phosphorescense Analyzer
SIM = Single Ion Monitoring
SM = Standard Method
TCLP = Toxicity Characteristic Leaching Procedure

(1) The Standard Operating Procedures (SOPs) Review Date is the date of the laboratory's current approved SOPs that will be implemented for this project. Laboratories are responsible for notifying ENVIRON of any revisions to the SOPs referenced above. The use of revised SOPs are subject to approval.

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

(3) Silicon will also analyzed by this method.

(4) Certain metals will be analyzed by EPA Method 200.8 / 6020 to overcome matrix interference from saltine groundwater and/or to achieve lower PQLs and MDLs.

(5) Niobium, palladium and/or sulfur

(6) Fluoride, chloride, bromide, sulfate, ortho-phosphate as P, ortho-phosphate as PO_4, nitrate as N, nitrite as NO_2, and/or nitrate as NO_3

(7) Water samples analyzed for perchlorate must be field filtered using sterile 20-millilter (mL) syringes and sterile surfactant free cellulose acetate 0.2 micrometer (µm) filters into sterile sample containers (125-mL sterile high density polyethylene bottles). Additional perchlorate sampling requirements are detailed in Nevada Division of Environmental Protection (NDEP) guidance documents (2010).

Sources:

Berman, Q.W. and Kolk, A.J. 2000. Modified Elutriator Method for the Determination of Asbestos in Soil and Bulk Materials, Revision 1. Submitted to the U.S. Environmental Protection Agency, Region 8, May 23.

NDEP. 2010. Email from Sara Rairick, Lab Certification Officer, Nevada Division of Environmental Protection, re: Sterile Filtration Required for Perchlorate Sampling. July 9.

TABLE 2. SOIL ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Metals (mg/kg)											
EPA Method 200.7 / 6010B											
Aluminum	7429-90-5	100,000	NDEP 2013	10.0	5.0		50	75 - 125	20	80 - 120	20
Antimony	7440-36-0	454	NDEP 2013	10.0	5.0		50	75 - 125	20	80 - 120	20
Barium	7440-39-3	100,000	NDEP 2013	1.5	0.75		50	75 - 125	20	80 - 120	20
Beryllium	7440-41-7	2,228	NDEP 2013	0.50	0.25		50	75 - 125	20	80 - 120	20
Boron	7440-42-8	100,000	NDEP 2013	5.0	2.5		50	75 - 125	20	80 - 120	20
Cadmium	7440-43-9	1,114	NDEP 2013	0.50	0.25		50	75 - 125	20	80 - 120	20
Calcium	7440-70-2	--	NDEP 2013	25.0	12.5		50	75 - 125	20	80 - 120	20
Chromium (total)	7440-47-3	100,000	NDEP 2013	1.0	0.50		50	75 - 125	20	80 - 120	20
Cobalt	7440-48-4	337	NDEP 2013	1.0	0.50		50	75 - 125	20	80 - 120	20
Copper	7440-50-8	42,178	NDEP 2013	2.0	1.0		50	75 - 125	20	80 - 120	20
Iron	7439-89-6	100,000	NDEP 2013	10.0	5.0		50	75 - 125	20	80 - 120	20
Lead	7439-92-1	800	NDEP 2013	2.0	1.0		50	75 - 125	20	80 - 120	20
Magnesium	7439-95-4	100,000	NDEP 2013	10.0	5.0		50	75 - 125	20	80 - 120	20
Manganese	7439-96-5	24,927	NDEP 2013	2.0	1.0		50	75 - 125	20	80 - 120	20
Molybdenum	7439-98-7	5,678	NDEP 2013	2.0	1.0		50	75 - 125	20	80 - 120	20
Nickel	7440-02-0	21,770	NDEP 2013	2.0	1.0		50	75 - 125	20	80 - 120	20
Potassium	7440-09-7	--	NDEP 2013	62.5	30		50	75 - 125	20	80 - 120	20
Silver	7440-22-4	5,678	NDEP 2013	1.5	0.75		50	75 - 125	20	80 - 120	20
Sodium	7440-23-5	--	NDEP 2013	62.5	30.0		50	75 - 125	20	80 - 120	20
Strontium	7440-24-6	100,000	NDEP 2013	5.0	2.5		50	75 - 125	20	80 - 120	20
Tin	7440-31-5	100,000	NDEP 2013	10	2.5		50	75 - 125	20	80 - 120	20
Titanium	7440-32-6	100,000	NDEP 2013	2.0	1.0		50	75 - 125	20	80 - 120	20
Thallium	7440-28-0	75	NDEP 2013	10	5.0		50	75 - 125	20	80 - 120	20
Tungsten	7440-33-7	8,513	NDEP 2013	10	5.0		50	75 - 125	20	80 - 120	20
Vanadium	7440-62-2	5,678	NDEP 2013	1.0	0.5		50	75 - 125	20	80 - 120	20
Zinc	7440-66-6	100,000	NDEP 2013	5.0	2.5		50	75 - 125	20	80 - 120	20
EPA Method 7199											
Chromium (hexavalent)	18540-29-9	1,226	NDEP 2013	0.800	0.150		50	55 - 110	20	65 - 110	20

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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
EPA Method 200.8 / 6020											
Arsenic	7440-38-2	7.2	NDEP 2013	0.500	0.250		50	80 - 120	20	80 - 120	20
Selenium	7782-49-2	5,678	NDEP 2013	1.00	0.500		50	80 - 120	20	80 - 120	20
EPA Method 7471A											
Mercury	7439-97-6	182	NDEP 2013	0.0200	0.0120		50	70 - 130	20	80 - 120	20
EPA Method 6020A											
Platinum	7440-06-4	568	NDEP 2013	0.100	0.0190		50	75 - 125	30	80 - 120	20
Volatile Organic Compounds (mg/kg)											
EPA Method 8260B											
1,1,1,2-Tetrachloroethane	630-20-6	20	NDEP 2013	2.000	0.001		50	65 - 145	20	70 - 130	20
1,1,1-Trichloroethane	71-55-6	1,385	NDEP 2013	0.001	0.0005		50	65 - 145	20	65 - 135	20
1,1,2,2-Tetrachloroethane	79-34-5	2.5	NDEP 2013	0.002	0.001		50	40 - 160	30	55 - 140	30
1,1,2-Trichloroethane	79-00-5	5.5	NDEP 2013	0.001	0.0005		50	65 - 140	30	65 - 135	20
1,1-Dichloroethane	75-34-3	21	NDEP 2013	0.001	0.0005		50	65 - 135	25	70 - 130	20
1,1-Dichloroethene	75-35-4	1,274	NDEP 2013	0.002	0.0005		50	65 - 135	25	70 - 125	20
1,1-Dichloropropene	563-58-6	--	NDEP 2013	0.001	0.0005		50	65 - 135	20	70 - 130	20
1,2,3-Trichlorobenzene	120-82-1	110	NDEP 2013	0.005	0.001		50	50 - 140	30	70 - 135	20
1,2,3-Trichloropropane	96-18-4	0.11	NDEP 2013	0.010	0.001		50	50 - 150	30	60 - 135	25
1,2,4-Trichlorobenzene	120-82-1	110	NDEP 2013	0.005	0.001		50	50 - 140	30	70 - 135	20
1,2,4-Trimethylbenzene	95-63-6	604	NDEP 2013	0.002	0.001		50	65 - 140	25	70 - 125	20
1,2-Dibromo-3-chloropropane	96-12-8	0.053	NDEP 2013	0.005	0.002		50	40 - 150	30	50 - 135	30
1,2-Dibromoethane	106-93-4	0.18	NDEP 2013	0.001	0.0005		50	65 - 140	25	70 - 130	20
1,2-Dichlorobenzene	95-50-1	373	NDEP 2013	0.001	0.0005		50	70 - 130	25	75 - 120	20
1,2-Dichloroethane	107-06-2	2.2	NDEP 2013	0.001	0.0005		50	60 - 150	25	60 - 140	20
1,2-Dichloropropane	78-87-5	4.3	NDEP 2013	0.001	0.0005		50	65 - 130	20	70 - 130	20
1,3,5-Trimethylbenzene	108-67-8	246	NDEP 2013	0.002	0.001		50	65 - 135	25	70 - 125	20
1,3-Dichlorobenzene	541-73-1	373	NDEP 2013	0.001	0.0005		50	70 - 130	25	75 - 125	20
1,3-Dichloropropane	142-28-9	65	NDEP 2013	0.001	0.0005		50	65 - 140	25	70 - 125	20

TABLE 2. SOIL ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

						QUALITY CONTROL LIMITS[2]					
ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
1,4-Dichlorobenzene	106-46-7	14	NDEP 2013	0.001	0.0005		50	70 - 130	25	75 - 120	20
2,2-Dichloropropane	594-20-7	--	NDEP 2013	0.002	0.001		50	65 - 150	25	60 - 145	20
2-Butanone	78-93-3	34,092	NDEP 2013	0.010	0.005		50	25 - 170	40	40 - 145	35
2-Chlorotoluene	95-49-8	511	NDEP 2013	0.002	0.001		50	60 - 135	25	70 - 125	20
2-Hexanone	591-78-6	1933	NDEP 2013	0.010	0.005		50	35 - 160	40	40 - 150	35
4-Chlorotoluene	106-43-4	--	NDEP 2013	0.002	0.001		50	65 - 135	25	75 - 125	20
4-Methyl-2-pentanone	108-10-1	17,196	NDEP 2013	0.005	0.0025		50	40 - 155	40	40 - 145	35
Acetone	67-64-1	100,000	NDEP 2013	0.020	0.008		50	20 - 145	40	25 - 145	30
Benzene	71-43-2	4.2	NDEP 2013	0.001	0.0005		50	65 - 130	20	65 - 120	20
Bromobenzene	108-86-1	695	NDEP 2013	0.002	0.001		50	65 - 140	25	75 - 120	20
Bromochloromethane	74-97-5	--	NDEP 2013	0.002	0.001		50	65 - 145	25	70 - 135	20
Bromodichloromethane	75-27-4	3.4	NDEP 2013	0.001	0.0005		50	65 - 145	20	70 - 135	20
Bromoform	75-25-2	242	NDEP 2013	0.002	0.001		50	50 - 145	30	55 - 135	25
Bromomethane	74-83-9	39	NDEP 2013	0.002	0.001		50	60 - 155	25	60 - 145	20
Carbon Tetrachloride	56-23-5	3.84	NDEP 2013	0.002	0.0005		50	60 - 145	25	65 - 140	20
Chlorobenzene	108-90-7	695	NDEP 2013	0.001	0.0005		50	70 - 130	25	75 - 120	20
Chloroethane	75-00-3	1,096	NDEP 2013	0.002	0.001		50	60 - 150	25	60 - 140	25
Chloroform	67-66-3	1.6	NDEP 2013	0.001	0.0005		50	65 - 135	20	70 - 130	20
Chloromethane	74-87-3	8.1	NDEP 2013	0.002	0.001		50	40 - 145	25	45 - 145	25
cis-1,2-Dichloroethene	156-59-2	737	NDEP 2013	0.001	0.0005		50	65 - 135	25	70 - 125	20
cis-1,3-Dichloropropene	10061-01-5	--	NDEP 2013	0.001	0.0005		50	70 - 135	25	75 - 125	20
Dibromochloromethane	124-48-1	6.0	NDEP 2013	0.001	0.0005		50	60 - 145	25	65 - 140	20
Dibromomethane	74-95-3	191	NDEP 2013	0.001	0.0005		50	65 - 140	25	70 - 130	20
Dichlorodifluoromethane	75-71-8	340	NDEP 2013	0.002	0.001		50	30 - 160	35	35 - 160	30
Diisopropyl ether (DIPE)	108-20-3	--	NDEP 2013	0.002	0.001		50	60 - 150	25	60 - 140	20
Ethyl-tert-butyl ether (ETBE)	637-92-3	--	NDEP 2013	0.002	0.001		50	60 - 145	30	60 - 140	20
Ethylbenzene	100-41-4	20	NDEP 2013	0.001	0.0005		50	70 - 135	25	70 - 125	20
Hexachlorobutadiene	87-68-3	25	NDEP 2013	0.002	0.001		50	50 - 145	35	60 - 135	20
Isopropyl Benzene	98-82-8	647	NDEP 2013	0.001	0.0005		50	70 - 145	25	75 - 130	20
Methylene Chloride	75-09-2	59	NDEP 2013	0.010	0.005		50	55 - 145	25	55 - 135	20

TABLE 2. SOIL ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Methyl-tert-butyl ether (MTBE)	1634-04-4	208	NDEP 2013	0.002	0.001		50	55 - 155	35	60 - 140	25
Naphthalene	91-20-3	16	NDEP 2013	0.002	0.001		50	40 - 150	40	55 - 135	25
n-Butylbenzene	104-51-8	237	NDEP 2013	0.002	0.001		50	55 - 145	30	70 - 130	20
n-Propylbenzene	103-65-1	237	NDEP 2013	0.001	0.0005		50	65 - 140	25	70 - 130	20
p-Isopropyltoluene	99-87-6	647	NDEP 2013	0.001	0.0005		50	60 - 140	25	75 - 125	20
sec-Butylbenzene	135-98-8	223	NDEP 2013	0.002	0.001		50	60 - 135	25	70 - 125	20
Styrene	100-42-5	1,734	NDEP 2013	0.001	0.0005		50	70 - 140	25	75 - 130	20
tert-Amyl-methyl ether (TAME)	994-05-8	--	NDEP 2013	0.002	0.001		50	60 - 150	25	60 - 145	20
tert-Butyl alcohol (TBA)	75-65-0	21,283	NDEP 2013	0.050	0.01		50	65 - 145	30	70 - 135	20
tert-Butylbenzene	98-06-6	393	NDEP 2013	0.002	0.001		50	60 - 140	25	70 - 125	20
Tetrachloroethene	127-18-4	3.3	NDEP 2013	0.001	0.0005		50	65 - 135	25	70 - 125	20
Toluene	108-88-3	521	NDEP 2013	0.001	0.0005		50	70 - 130	20	70 - 125	20
trans-1,2-Dichloroethene	156-60-5	547	NDEP 2013	0.001	0.0005		50	70 - 135	25	70 - 125	20
trans-1,3-Dichloropropene	10061-02-6	--	NDEP 2013	0.001	0.0005		50	60 - 145	25	70 - 135	20
Trichloroethene	79-01-6	5.5	NDEP 2013	0.001	0.0005		50	65 - 140	25	70 - 125	20
Trichlorofluoromethane	75-69-4	1,983	NDEP 2013	0.002	0.001		50	55 - 155	25	60 - 145	25
Vinyl Chloride	75-01-4	1.9	NDEP 2013	0.002	0.001		50	55 - 140	30	55 - 135	25
m,p-Xylene[5]	179601-23-1	214	NDEP 2013	0.002	0.001		50	70 - 130	25	70 - 125	20
o-Xylene	95-47-6	282	NDEP 2013	0.001	0.0005		50	65 - 130	25	70 - 125	20
4-Bromofluorobenzene (Surr)	460-00-4	--	--	--	--	79 - 120					
Dibromofluoromethane (Surr)	1868-53-7	--	--	--	--	60 - 120					
Toluene-d8 (Surr)	2037-26-5	--	--	--	--	79 - 123					
EPA Method 8260B SIM											
1,4-dioxane	123-91-1	19	NDEP 2013	0.005	0.0011		50	70 - 130	30	70 - 130	30
Dibromofluoromethane (Surr)	1868-53-7	--	--	--	--	80 - 125					
Semi-Volatile Organic Compounds (mg/kg)											
EPA Method 8270C											
2-Methylnaphthalene	91-57-6	--	NDEP 2013	0.330	0.07		50	40 - 120	20	45 - 120	20

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ANALYTES	CAS Number	Screening Level	Screening Level Source[(1)]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[(2)] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Acenaphthene	83-32-9	2,351	NDEP 2013	0.330	0.067		50	45 - 120	25	50 - 120	20
Acenaphthylene	208-96-8	147	NDEP 2013	0.330	0.07		50	45 - 120	20	50 - 120	20
Anthracene	120-12-7	9,060	NDEP 2013	0.330	0.08		50	55 - 120	25	55 - 120	20
Benzo(a)anthracene	56-55-3	2.3	NDEP 2013	0.330	0.07		50	50 - 120	25	55 - 120	20
Benzo(a)pyrene	50-32-8	0.23	NDEP 2013	0.330	0.067		50	45 - 125	25	50 - 125	20
Benzo(b)fluoranthene	205-99-2	2.3	NDEP 2013	0.330	0.067		50	45 - 125	30	45 - 125	25
Benzo(g,h,i)perylene	191-24-2	34,067	NDEP 2013	0.330	0.11		50	25 - 130	30	35 - 130	25
Benzo(k)fluoranthene	207-08-9	23	NDEP 2013	0.330	0.07		50	45 - 125	30	45 - 125	25
Bis(2-ethylhexyl)phthalate	117-81-7	137	NDEP 2013	0.330	0.09		50	45 - 130	25	50 - 130	20
Butylbenzylphthalate	85-68-7	240	NDEP 2013	0.330	0.08		50	45 - 125	25	50 - 125	20
Chrysene	218-01-9	234	NDEP 2013	0.330	0.075		50	55 - 120	25	55 - 120	20
Dibenzo(a,h)anthracene	53-70-3	0.23	NDEP 2013	0.420	0.1		50	25 - 135	30	40 - 135	25
Diethylphthalate	84-66-2	100,000	NDEP 2013	0.330	0.095		50	50 - 125	25	50 - 125	20
Dimethylphthalate	131-11-3	100,000	NDEP 2013	0.330	0.067		50	45 - 125	25	50 - 125	20
Di-n-butylphthalate	84-74-2	68,407	NDEP 2013	0.330	0.09		50	50 - 125	25	50 - 125	20
Di-n-octylphthalate	117-84-0	--	NDEP 2013	0.330	0.09		50	50 - 135	25	50 - 135	20
Fluoranthene	206-44-0	24,447	NDEP 2013	0.330	0.07		50	45 - 120	25	55 - 120	20
Fluorene	86-73-7	3,438	NDEP 2013	0.330	0.07		50	50 - 120	25	55 - 120	20
Hexachlorobenzene	118-74-1	1.2	NDEP 2013	0.330	0.07		50	50 - 120	25	50 - 120	20
Indeno(1,2,3-cd)pyrene	193-39-5	2.3	NDEP 2013	0.330	0.13		50	20 - 130	30	30 - 135	25
Naphthalene	91-20-3	16	NDEP 2013	0.330	0.067		50	40 - 120	25	45 - 120	20
Nitrobenzene	98-95-3	14	NDEP 2013	0.330	0.07		50	40 - 120	25	45 - 120	20
Octachlorostyrene	29082-74-4	--	NDEP 2013	3.300	2.3		50	60 - 140	30	60 - 140	30
Phenanthrene	85-01-8	25	NDEP 2013	0.330	0.067		50	50 - 120	25	50 - 120	20
Pyrene	129-00-0	19,340	NDEP 2013	0.330	0.08		50	40 - 125	30	45 - 125	25
Pyridine	110-86-1	667	NDEP 2013	0.200	0.07		50	25 - 130	30	25 - 130	30
2-Fluorophenol (Surr)	367-12-4	--	--	--	--	35 - 120					
2,4,6-Tribromophenol (Surr)	118-79-6	--	--	--	--	35 - 120					
Nitrobenzene-d5 (Surr)	4165-60-0	--	--	--	--	35 - 120					
Terphenyl-d14 (Surr)	1718-51-0	--	--	--	--	35 - 120					

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Phenol-d6 (Surr)	13127-88-3	--	--	--	--	35 - 120					
Organophosphorous Pesticides (mg/kg)											
EPA Method 8141A											
Azinphos-methyl	86-50-0	--	NDEP 2013	0.013	0.0035		50	51 - 122	43	51 - 122	43
Bolstar (Sulprofos)	35400-43-2	--	NDEP 2013	0.013	0.00424		50				
Chlorpyrifos	2921-88-2	2,052	NDEP 2013	0.020	0.00646		50	38 - 130	37	38 - 130	37
Coumaphos	56-72-4	--	NDEP 2013	0.013	0.0028		50	50 - 119	27	50 - 119	27
Demeton-O	298-03-3	--	NDEP 2013	0.039	0.00529		50				
Demeton-S	126-75-0	--	NDEP 2013	0.015	0.00486		50				
Diazinon	333-41-5	616	NDEP 2013	0.022	0.00727		50	53 - 115	40	53 - 115	40
Dichlorvos	62-73-7	6.6	NDEP 2013	0.023	0.0074		50	43 - 139	77	43 - 139	77
Dimethoate	60-51-5	--	NDEP 2013	0.022	0.00708		50	25 - 138	98	25 - 138	98
Disulfoton	298-04-4	27	NDEP 2013	0.048	0.00773		50	29 - 115	40	29 - 115	40
EPN (Ethyl P-Nitorphenyl Benzenethiophosphate)	2104-64-5	--	NDEP 2013	0.013	0.00368		50	58 - 131	50	58 - 131	50
Ethoprop	13194-48-4	--	NDEP 2013	0.015	0.00493		50	53 - 115	54	53 - 115	54
Famphur	52-85-7	--	NDEP 2013	0.013	0.00322		50	49 - 140	31	49 - 140	31
Fensulfothion	115-90-2	--	NDEP 2013	0.025	0.00815		50	52 - 121	49	52 - 121	49
Fenthion	55-38-9	--	NDEP 2013	0.033	0.00874		50	45 - 115	43	45 - 115	43
Malathion	121-75-5	13,681	NDEP 2013	0.015	0.00464		50	50 - 122	53	50 - 122	53
Merphos	150-50-5	--	NDEP 2013	0.030	0.00514		50	19 - 115	50	19 - 115	50
Mevinphos	7786-34-7	--	NDEP 2013	0.015	0.00462		50	10 - 226	78	10 - 226	78
Naled	300-76-5	1,368	NDEP 2013	0.070	0.0226		50	10 - 115		10 - 115	
Parathion-ethyl	56-38-2	4,104	NDEP 2013	0.018	0.00529		50	24 - 163	47	24 - 163	47
Parathion-methyl	298-00-0	171	NDEP 2013	0.020	0.00637		50	46 - 119	53	46 - 119	53
Phorate	298-02-2	--	NDEP 2013	0.020	0.0057		50	40 - 115	40	40 - 115	40
Ronnel	299-84-3	34,203	NDEP 2013	0.046	0.0152		50	43 - 118	41	43 - 118	41
Stirphos (Tetrachlorovinphos)	22248-79-9	80	NDEP 2013	0.015	0.00436		50	44 - 118	24	44 - 118	24
Sulfotepp	3689-24-5	--	NDEP 2013	0.020	0.00626		50	55 - 115	40	55 - 115	

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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Thionazin	297-97-2	--	NDEP 2013	0.018	0.00557		50	46 - 115	40	46 - 115	40
Tokuthion	34643-46-4	--	NDEP 2013	0.020	0.00391		50				
Trichloronate	327-98-0	--	NDEP 2013	0.020	0.00625		50	27 - 115	43	27 - 115	43
Organochlorine Pesticides (mg/kg)											
EPA Method 8081A											
4,4'-DDD	72-54-8	11	NDEP 2013	0.005	0.0015		50	40 - 130	30	60 - 120	30
4,4'-DDE	72-55-9	7.8	NDEP 2013	0.005	0.0015		50	35 - 130	30	60 - 120	30
4,4'-DDT	50-29-3	7.8	NDEP 2013	0.005	0.0015		50	35 - 130	30	65 - 120	30
Aldrin	309-00-2	0.11	NDEP 2013	0.005	0.0015		50	40 - 115	30	50 - 115	30
alpha-BHC	319-84-6	270	NDEP 2013	0.005	0.0015		50	40 - 115	30	60 - 115	30
alpha-Chlordane	57-74-9	7.2	NDEP 2013	0.050	0.01		50	60 - 140	30	60 - 140	30
beta-BHC	319-85-7	54	NDEP 2013	0.005	0.0015		50	40 - 120	30	60 - 115	30
Chlordane, technical	57-74-9	7.2	NDEP 2013	0.050	0.01		50	60 - 140	30	60 - 140	30
delta-BHC	319-86-8	270	NDEP 2013	0.010	0.0015		50	45 - 120	30	60 - 115	30
Dieldrin	60-57-1	0.12	NDEP 2013	0.005	0.0015		50	40 - 125	30	65 - 115	30
Endosulfan I	959-98-8	4,104	NDEP 2013	0.005	0.0015		50	40 - 120	30	40 - 120	30
Endosulfan II	33213-65-9	4,104	NDEP 2013	0.005	0.0015		50	40 - 125	30	55 - 120	30
Endosulfan sulfate	1031-07-8	4,104	NDEP 2013	0.010	0.002		50	45 - 120	30	65 - 115	30
Endrin	72-20-8	205	NDEP 2013	0.005	0.0015		50	45 - 125	30	55 - 120	30
Endrin aldehyde	7421-93-4	205	NDEP 2013	0.005	0.0015		50	30 - 120	30	55 - 115	30
Endrin Ketone	53494-70-5	205	NDEP 2013	0.005	0.002		50	40 - 120	30	65 - 115	30
gamma-BHC (Lindane)	58-89-9	9.0	NDEP 2013	0.005	0.0015		50	40 - 120	30	55 - 115	30
gamma-Chlordane	57-74-9	7.2	NDEP 2013	0.050	0.01		50	60 - 140	30	60 - 140	30
Heptachlor	76-44-8	0.43	NDEP 2013	0.005	0.002		50	40 - 115	30	55 - 115	30
Heptachlor epoxide	1024-57-3	0.21	NDEP 2013	0.005	0.002		50	45 - 115	30	55 - 115	30
Methoxychlor	72-43-5	3,420	NDEP 2013	0.005	0.0015		50	40 - 135	30	65 - 120	30
Toxaphene	8001-35-2	1.7	NDEP 2013	0.200	0.05		50	60 - 140	30	60 - 140	30
Decachlorobiphenyl (Surr)	2051-24-3	--	--	--	--	45 - 120					

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Dioxins/Furans (pg/g)[4]											
EPA Method 8290											
2,3,7,8- Tetrachlorodibenzo-p-dioxin TEQ	1746-01-6-TEQ	2700	NDEP 2010								
1,2,3,4,6,7,8,9-Ocatchlorodibenzofuran	39001-02-0	--	NDEP 2013	10	EDL[3]		50	63 - 141	20	63 - 141	20
1,2,3,4,6,7,8,9-Ocatchlorodibenzodioxin	3268-87-9	--	NDEP 2013	10	EDL[3]		50	70 - 128	20	70 - 128	20
1,2,3,4,6,7,8-Heptatchlorodibenzofuran	67562-39-4	--	NDEP 2013	5	EDL[3]		50	71 - 134	20	71 - 134	20
1,2,3,4,6,7,8-Heptatchlorodibenzo-p-dioxin	35822-46-9	--	NDEP 2013	5	EDL[3]		50	71 - 128	20	71 - 128	20
1,2,3,4,7,8,9-Heptatchlorodibenzofuran	55673-89-7	--	NDEP 2013	5	EDL[3]		50	68 - 129	20	68 - 129	20
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	--	NDEP 2013	5	EDL[3]		50	74 - 128	20	74 - 128	20
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	--	NDEP 2013	5	EDL[3]		50	60 - 138	20	60 - 138	20
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	--	NDEP 2013	5	EDL[3]		50	67 - 140	20	67 - 140	20
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	--	NDEP 2013	5	EDL[3]		50	68 - 136	20	68 - 136	20
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	--	NDEP 2013	5	EDL[3]		50	72 - 134	20	72 - 134	20
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	309	NDEP 2013	5	EDL[3]		50	68 - 138	20	68 - 138	20
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	--	NDEP 2013	5	EDL[3]		50	69 - 134	20	69 - 134	20
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	--	NDEP 2013	5	EDL[3]		50	70 - 122	20	70 - 122	20
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	--	NDEP 2013	5	EDL[3]		50	71 - 137	20	71 - 137	20
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	--	NDEP 2013	5	EDL[3]		50	67 - 140	20	67 - 140	20
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	--	NDEP 2013	1	EDL[3]		50	56 - 158	20	56 - 158	20

TABLE 2. SOIL ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	1000	NDEP 2013	1	EDL[3]		50	60 - 138	20	60 - 138	20
PCBs as Congeners (µg/kg)											
EPA Method 1668A											
2-MoCB	2051-60-7	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
3-MoCB	2051-61-8	0.83	NDEP 2013	0.02	EDL[3]		50				
4-MoCB	2051-62-9	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,2'-DiCB	13029-08-8	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,3-DiCB	16605-91-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3'-DiCB	25569-80-6	0.83	NDEP 2013	0.02	EDL[3]		50				
2,4-DiCB	33284-50-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,4'-DiCB	34883-43-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,5-DiCB	34883-39-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,6-DiCB	33146-45-1	0.83	NDEP 2013	0.02	EDL[3]		50				
3,3'-DiCB	2050-67-1	0.83	NDEP 2013	0.02	EDL[3]		50				
3,4-DiCB	2974-92-7	0.83	NDEP 2013	0.04	EDL[3]		50				
3,4'-DiCB	2974-90-5	0.83	NDEP 2013	0.04	EDL[3]		50				
3,5-DiCB	34883-41-5	0.83	NDEP 2013	0.02	EDL[3]		50				
4,4'-DiCB	2050-68-2	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,2',3-TrCB	38444-78-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',4-TrCB	37680-66-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',5-TrCB	37680-65-2	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',6-TrCB	38444-73-4	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3'-TrCB	38444-84-7	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3,4-TrCB	55702-46-0	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3,4'-TrCB	38444-85-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,5-TrCB	55720-44-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,6-TrCB	55702-45-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3',4-TrCB	55712-37-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3',5-TrCB	38444-81-4	0.83	NDEP 2013	0.04	EDL[3]		50				

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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
2,3',6-TrCB	38444-76-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,4,4'-TrCB	7012-37-5	0.83	NDEP 2013	0.04	EDL[3]		50				
2,4,5-TrCB	15862-07-4	0.83	NDEP 2013	0.04	EDL[3]		50				
2,4,6-TrCB	35693-92-6	0.83	NDEP 2013	0.04	EDL[3]		50				
2,4',5-TrCB	16606-02-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,4',6-TrCB	38444-77-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2',3,4-TrCB	38444-86-9	0.83	NDEP 2013	0.04	EDL[3]		50				
2',3,5-TrCB	37680-68-5	0.83	NDEP 2013	0.02	EDL[3]		50				
3,3',4-TrCB	37680-69-6	0.83	NDEP 2013	0.02	EDL[3]		50				
3,3',5-TrCB	38444-87-0	0.83	NDEP 2013	0.02	EDL[3]		50				
3,4,4'-TrCB	38444-90-5	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
3,4,5-TrCB	53555-66-1	0.83	NDEP 2013	0.02	EDL[3]		50				
3,4',5-TrCB	38444-88-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3'-TeCB	38444-93-8	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4-TeCB	52663-59-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4'-TeCB	36559-22-5	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,5-TeCB	70362-46-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,5'-TeCB	41464-39-5	0.83	NDEP 2013	0.06	EDL[3]		50				
2,2',3,6-TeCB	70362-45-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,6'-TeCB	41464-47-5	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',4,4'-TeCB	2437-79-8	0.83	NDEP 2013	0.06	EDL[3]		50				
2,2',4,5-TeCB	70362-47-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',4,5'-TeCB	41464-40-8	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',4,6-TeCB	62796-65-0	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',4,6'-TeCB	68194-04-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',5,5'-TeCB	35693-99-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',5,6'-TeCB	41464-41-9	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',6,6'-TeCB	15968-05-5	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4'-TeCB	74338-24-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4'-TeCB	41464-43-1	0.83	NDEP 2013	0.02	EDL[3]		50				

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2,3,3',5-TeCB	70424-67-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',5'-TeCB	41464-49-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',6-TeCB	74472-33-6	0.83	NDEP 2013	0.06	EDL[3]		50				
2,3,4,4'-TeCB	33025-41-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,4,5-TeCB	33284-53-6	0.83	NDEP 2013	0.08	EDL[3]		50				
2,3,4,6-TeCB	54230-22-7	0.83	NDEP 2013	0.06	EDL[3]		50				
2,3,4',5-TeCB	74472-34-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,4',6-TeCB	52663-58-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,5,6-TeCB	33284-54-7	0.83	NDEP 2013	0.06	EDL[3]		50				
2,3',4,4'-TeCB	32598-10-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3',4,5-TeCB	73575-53-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3',4,5'-TeCB	73575-52-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3',4,6-TeCB	60233-24-1	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3',4',5-TeCB	32598-11-1	0.83	NDEP 2013	0.08	EDL[3]		50				
2,3',4',6-TeCB	41464-46-4	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3',5,5'-TeCB	41464-42-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3',5',6-TeCB	74338-23-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,4,4',5-TeCB	32690-93-0	0.83	NDEP 2013	0.08	EDL[3]		50				
2,4,4',6-TeCB	32598-12-2	0.83	NDEP 2013	0.06	EDL[3]		50				
2',3,4,5-TeCB	70362-48-0	0.83	NDEP 2013	0.08	EDL[3]		50				
3,3',4,4'-TeCB	32598-13-3	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
3,3',4,5-TeCB	70362-49-1	0.83	NDEP 2013	0.02	EDL[3]		50				
3,3',4,5'-TeCB	41464-48-6	0.83	NDEP 2013	0.02	EDL[3]		50				
3,3',5,5'-TeCB	33284-52-5	0.83	NDEP 2013	0.02	EDL[3]		50				
3,4,4',5-TeCB6	70362-50-4	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,2',3,3',4-PeCB	52663-62-4	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',5-PeCB	60145-20-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',6-PeCB	52663-60-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4'-PeCB	65510-45-4	0.83	NDEP 2013	0.06	EDL[3]		50				
2,2',3,4,5-PeCB	55312-69-1	0.83	NDEP 2013	0.12	EDL[3]		50				

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						%R	RPD	%R	RPD	%R	RPD
2,2',3,4,5'-PeCB	38380-02-8	0.83	NDEP 2013	0.12	EDL[3]		50				
2,2',3,4,6-PeCB	55215-17-3	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4,6'-PeCB	73575-57-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4',5-PeCB	68194-07-0	0.83	NDEP 2013	0.06	EDL[3]		50				
2,2',3,4',6-PeCB	68194-05-8	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,5,5'-PeCB	52663-61-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,5,6-PeCB	73575-56-1	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,5,6'-PeCB	73575-55-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,5',6-PeCB	38379-99-6	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,6,6'-PeCB	73575-54-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3',4,5-PeCB	41464-51-1	0.83	NDEP 2013	0.12	EDL[3]		50				
2,2',3',4,6-PeCB	60233-25-2	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',4,4',5-PeCB	38380-01-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',4,4',6-PeCB	39485-83-1	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',4,5,5'-PeCB	37680-73-2	0.83	NDEP 2013	0.06	EDL[3]		50				
2,2',4,5,6'-PeCB	68194-06-9	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',4,5,'6-PeCB	60145-21-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',4,6,6'-PeCB	56558-16-8	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4,4'-PeCB	32598-14-4	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4,5-PeCB	70424-69-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4',5-PeCB	70424-68-9	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3,3',4,5'-PeCB	70362-41-3	0.83	NDEP 2013	0.12	EDL[3]		50				
2,3,3',4,6-PeCB	74472-35-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4',6-PeCB	38380-03-9	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3,3',5,5'-PeCB	39635-32-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',5,6-PeCB	74472-36-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',5',6-PeCB	68194-10-5	0.83	NDEP 2013	0.06	EDL[3]		50				
2,3,4,4',5-PeCB	74472-37-0	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,4,4',6-PeCB	74472-38-1	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3,4,5,6-PeCB	18259-05-7	0.83	NDEP 2013	0.06	EDL[3]		50				

TABLE 2. SOIL ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
2,3,4',5,6-PeCB	68194-11-6	0.83	NDEP 2013	0.06	EDL[3]		50				
2,3',4,4',5-PeCB	31508-00-6	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,3',4,4',6-PeCB	56558-17-9	0.83	NDEP 2013	0.12	EDL[3]		50				
2,3',4,5,5'-PeCB	68194-12-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3',4,5,'6-PeCB	56558-18-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2',3,3',4,5-PeCB	76842-07-4	0.83	NDEP 2013	0.02	EDL[3]		50				
2',3,4,4',5-PeCB	65510-44-3	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2',3,4,5,5'-PeCB	70424-70-3	0.83	NDEP 2013	0.04	EDL[3]		50				
2',3,4,5,6'-PeCB	74472-39-2	0.83	NDEP 2013	0.12	EDL[3]		50				
3,3',4,4',5-PeCB	57465-28-8	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
3,3',4,5,5'-PeCB	39635-33-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,4'-HxCB	38380-07-3	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',4,5-HxCB	55215-18-4	0.83	NDEP 2013	0.06	EDL[3]		50				
2,2',3,3',4,5'-HxCB	52663-66-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,6-HxCB	61798-70-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,6'-HxCB	38380-05-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',5,5'-HxCB	35694-04-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',5,6-HxCB	52704-70-8	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',5,6'-HxCB	52744-13-5	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',6,6'-HxCB	38411-22-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4',5-HxCB	35694-06-5	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4',5'-HxCB	35065-28-2	0.83	NDEP 2013	0.06	EDL[3]		50				
2,2',3,4,4',6-HxCB	56030-56-9	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4,4',6'-HxCB	59291-64-4	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4,5,5'-HxCB	52712-04-6	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,5,6-HxCB	41411-61-4	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,5,6'-HxCB	68194-15-0	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4,5',6-HxCB	68194-14-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,6,6'-HxCB	74472-40-5	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4',5,5'-HxCB	51908-16-8	0.83	NDEP 2013	0.02	EDL[3]		50				

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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
2,2',3,4',5,6-HxCB	68194-13-8	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4',5,6'-HxCB	74472-41-6	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4',5',6-HxCB	38380-04-0	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4',6,6'-HxCB	68194-08-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,5,5',6-HxCB	52663-63-5	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,5,6,6'-HxCB	68194-09-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',4,4',5,5'-HxCB	35065-27-1	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',4,4',5',6-HxCB	60145-22-4	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',4,4',6,6'-HxCB	33979-03-2	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4,4',5-HxCB	38380-08-4	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4,4',5'-HxCB	69782-90-7	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4,4',6-HxCB	74472-42-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4,5,5'-HxCB	39635-35-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4,5,6-HxCB	41411-62-5	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4,5',6-HxCB	74472-43-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4',5,5'-HxCB	39635-34-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4',5,6-HxCB	74472-44-9	0.83	NDEP 2013	0.06	EDL[3]		50				
2,3,3',4',5',6-HxCB	74472-45-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',5,5',6-HxCB	74472-46-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,4,4',5,6-HxCB	41411-63-6	0.83	NDEP 2013	0.04	EDL[3]		50				
2,3',4,4',5,5'-HxCB	52663-72-6	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,3',4,4',5',6-HxCB	59291-65-5	0.83	NDEP 2013	0.04	EDL[3]		50	-		-	
3,3',4,4',5,5'-HxCB	32774-16-6	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,2',3,3',4,4',5-HpCB	35065-30-6	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2'3,3',4,4',6-HpCB	52663-71-5	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',4,5,5'-HpCB	52663-74-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,5,6-HpCB	68194-16-1	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',4,5,6'-HpCB	38411-25-5	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,5',6-HpCB	40186-70-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,6,6'-HpCB	52663-65-7	0.83	NDEP 2013	0.02	EDL[3]		50				

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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
2,2',3,3',4',5,6-HpCB	52663-70-4	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',5,5',6-HpCB	52663-67-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',5,6,6'-HpCB	52663-64-6	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4',5,5'-HpCB	35065-29-3	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,4,4',5,6-HpCB	74472-47-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4',5,6'-HpCB	60145-23-5	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4',5',6-HpCB	52663-69-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4',6,6'-HpCB	74472-48-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,5,5',6-HpCB	52712-05-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,5,6,6'-HpCB	74472-49-4	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4',5,5',6-HpCB	52663-68-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4',5,6,6'-HpCB	74487-85-7	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4,4',5,5'-HpCB	39635-31-9	0.83	NDEP 2013	0.00	EDL[3]		50	50 - 150	50	50 - 150	50
2,3,3',4,4',5,6-HpCB	41411-64-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4,4',5',6-HpCB	74472-50-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4,5,5',6-HpCB	74472-51-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4',5,5',6-HpCB	69782-91-8	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',4,4',5,5'-OcCB	35694-08-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,4',5,6-OcCB	52663-78-2	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,4',5,6'-OcCB	42740-50-1	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,4',6,6'-OcCB	33091-17-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,5,5',6-OcCB	68194-17-2	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',4,5,5',6'-OcCB	52663-75-9	0.83	NDEP 2013	0.04	EDL[3]		50				
2,2',3,3',4,5,6,6'-OcCB	52663-73-7	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,5',6,6'-OcCB	40186-71-8	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',5,5',6,6'-OcCB	2136-99-4	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,2',3,4,4',5,5',6-OcCB	52663-76-0	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,4,4',5,6,6'-OcCB	74472-52-9	0.83	NDEP 2013	0.02	EDL[3]		50				
2,3,3',4,4',5,5',6-OcCB	74472-53-0	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
2,2',3,3',4,4',5,5',6-NoCB	40186-72-9	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50

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ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
2,2',3,3',4,4',5,6,6'-NoCB	52663-79-3	0.83	NDEP 2013	0.02	EDL[3]		50				
2,2',3,3',4,5,5',6,6'-NoCB	52663-77-1	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
DeCB	2051-24-3	0.83	NDEP 2013	0.02	EDL[3]		50	50 - 150	50	50 - 150	50
PCBs as Aroclors (mg/kg)											
EPA Method 8082											
Aroclor 1016	12674-11-2	24	NDEP 2013	0.05	0.02		50	50 - 120	30	65 - 115	30
Aroclor 1221	11104-28-2	0.83	NDEP 2013	0.05	0.02		50				
Aroclor 1232	11141-16-5	0.83	NDEP 2013	0.05	0.02		50				
Aroclor 1242	53469-21-9	0.83	NDEP 2013	0.05	0.02		50				
Aroclor 1248	12672-29-6	0.83	NDEP 2013	0.05	0.02		50				
Aroclor 1254	11097-69-1	0.83	NDEP 2013	0.05	0.02		50				
Aroclor 1260	11096-82-5	0.83	NDEP 2013	0.05	0.02		50	50 - 125	30	65 - 115	30
DCB Decachlorobiphenyl (Surr)	2051-24-3	--	--	--	--	45 - 120					
Organic Acids (mg/kg)											
Organic Acid Analysis											
Benzenesulfonic acid	98-11-3	100,000	NDEP 2013	0.5	0.05-0.2[6]		50	60 - 135	20	70 - 135	
4-Chlorobenzenesulfonic acid	98-66-8	117	NDEP 2013	0.5	0.05-0.2[6]		50	56 - 139	20	70 - 130	
Diethyl phosphorodithioic acid	298-06-6	90,844	NDEP 2013	0.5	0.05-0.2[6]		50	51 - 130	20	63 - 130	
Dimethyl phosphorodithioic acid	756-80-9	100,000	NDEP 2013	2.5	0.05-0.2[6]		50	27 - 151	33	63 - 134	
Phthalic acid	88-99-3	100,000	NDEP 2013	0.5	0.05-0.2[6]		50	35 - 143	20	61 - 130	
Total Petroleum Hydrocarbons and Fuel Alcohols (mg/kg)											
EPA Method 8015B											
Gasoline Range Organics (C6-C10)	GRO (C6-C10)	100	ENVIRON 2012[7]	0.40	0.15		50	60 - 140	30	70 - 135	20
4-Bromofluorobenzene (Surr)	460-00-4	--	--	--	--	65 - 140					
Diesel Range Organics (C10-C28)	DRO (C10-C28)	100	ENVIRON 2012[7]	5.00	2.50		50	40 - 120	30	45 - 115	25

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						QUALITY CONTROL LIMITS[2]					
				Practical Quantitation Limit	Method Detection Limit	Surrogate	Duplicate	Matrix Spike		Blank Spike/LCS	
ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	(PQL)	(MDL)	%R	RPD	%R	RPD	%R	RPD
Oil Range Organics (C28-C40)	ORO (C28-C40)	100	ENVIRON 2012[7]	5.00	2.50		50	40 - 120	30	45 - 115	25
Wet Chemistry and Miscellanous Analytes (mg/kg except as noted)											
SM 2320B											
Alkalinity (total, CO3-,HCO3-)	--	--	NDEP 2013	500	--		50			90 - 110	20
SM 4500-NH3 D											
Ammonia as NH_3	7664-41-7	100,000	NDEP 2013	12.0	2.40		50	75 - 125	15	85 - 115	15
EPA Method 300.0											
Bromide	24959-67-9	100,000	NDEP 2013	5.00	3.50		50	80 - 120	20	90 - 110	20
Chloride	16887-00-6	--	NDEP 2013	5.00	4.00		50	80 - 120	20	90 - 110	20
Fluoride	16984-48-8	41,044	NDEP 2013	5.00	3.50		50	80 - 120	20	90 - 110	20
Sulfate	14808-79-8	--	NDEP 2013	5.00	4.00		50	80 - 120	20	90 - 110	20
Nitrate	14797-55-8	100,000	NDEP 2013	1.10	0.800		50	80 - 120	20	90 - 110	20
Nitrite	14797-65-0	100,000	NDEP 2013	1.50	1.10		50	80 - 120	20	90 - 110	20
Orthophosphate as P	14265-44-2	--	NDEP 2013	1.60	1.30		50	80 - 120	20	90 - 110	20
EPA Method 300.1											
Chlorate	7790-93-4	34,067	NDEP 2013	0.2	0.05		50	75 - 125	25	75 - 125	25
Dichloroacetic acid (Surr)	79-43-6	--	--	--	--	90 - 115					
EPA Method 9014B											
Cyanide (total)	57-12-5	28	NDEP 2013	0.500	0.430		50	70 - 115	15	90 - 110	10
EPA Method 120.1 / SM 2510B											
Conductivity (μmho/cm)	--	--	NDEP 2013	10.0			50			90 - 110	20
EPA Method 8315A											
Formaldehyde	50-00-0	66,980	NDEP 2013	1.00	0.600		50	50 - 150	20	50 - 150	20
EPA Method 314.0											
Perchlorate	14797-73-0	795	NDEP 2013	0.0400	0.00950		50	80 - 120	20	85 - 115	15
EPA Method 9045C											
pH	--	--	NDEP 2013	0.100			50				

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ANALYTES	CAS Number	Screening Level	Screening Level Source(1)	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS(2) Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
SM 5540C											
Surfactants (MBAS)	--	--	NDEP 2013	1.00	0.500		50	50 125	20	90 - 110	20
SM 2540C											
Total Dissolved Solids (TDS)	--	--	NDEP 2013	100	50.0		50			90 - 110	10
EPA Method 9060A / SM 5310B											
Total Organic Carbon	7440-44-0	--	NDEP 2013	1.00	0.750		50	80 - 120	20	90 - 110	20
SM 2540D											
Total Suspended Solids (TSS)	--	--	NDEP 2013	1000	500		50			85 - 115	10
Radionuclides (pCi/g)(8)											
See Table 1 for Individual Methods											
Total Uranium (mg/kg)	7440-61-1	3,400	NDEP 2013	0.10	0.10		50				
Radium-226	13982-63-3	0.023	NDEP 2013	1	1		50				
Radium-228	15262-20-1	0.041	NDEP 2013	1	1		50				
Thorium-228	14274-82-9	0.025	NDEP 2013	1	1		50				
Thorium-230	14269-63-7	8.3	NDEP 2013	1	1		50				
Thorium-232	7440-29-1	7.4	NDEP 2013	1	1		50				
Uranium-234	13966-29-5	11	NDEP 2013	1	1		50				
Uranium-235	15117-96-1	0.35	NDEP 2013	1	1		50				
Uranium-238	7440-61-1	1.4	NDEP 2013	1	1		50				
Asbestos (protocol structures)											
EPA Method 600/R-93/116 modified per Berman & Kolk (2000)											
Total Amphibole Protocol Structures	1332-21-4	--	--	Fiber Count(9)			50				
Long Amphibole Protocol Structures	1332-21-4	1 or more	NDEP (2010)	Fiber Count(9)			50				
Total Chrysotile Protocol Structures	1332-21-4	--	--	Fiber Count(9)			50				
Long Chrysotile Protocol Structures	1332-21-4	More than 5	NDEP (2010)	Fiber Count(9)			50				

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Total Asbestos Protocol Structures	1332-21-4	--	--	Fiber Count[9]			50				
Long Asbestos Protocol Structures	1332-21-4	--	--	Fiber Count[9]			50				

Notes:

Shaded PQLs and MDLs exceed the lowest screening criteria.

μg/kg = milligram per kilogram

mg/kg = milligram per kilogram

pCi/g = picoCurie per gram

pg/g = picogram per gram

protocol structure = asbestos protocol structures greater than 10 micrometers (μm) in length and less than 0.4 μm in width that is most responsible for asbestos related disease (NDEP 2011).

Surr = Surrogate

TEQ = toxicity equivalence

EPA = United States Environmental Protection Agency

SM = Standard Method

(1) Screening values obtained from (a) NDEP (2013) and are the lower of the indoor and outdoor industrial/commercial worker soil Basic Comparison Levels (BCLs); and (b) NDEP (2010) and are site-specific levels for indoor and outdoor industrial/commercial workers or based on regional background concentrations.

(2) QC Limits = Quality Control Limits for %R (Percent Recovery) of spiked compounds in Laboratory Control Samples (LCS) and surrogate compounds and Relative Percent Difference (RPD) between Matrix Spike (MS) and MS Duplicate (MSD) samples and LCS and LCS duplicate (LCSD) samples. Laboratory historical control limits are subject to change as a result of periodic re-evaluation. Limits in use at the time of sample analysis are available from the laboratory.

(3) EDL = Estimated Detection Limit. For each dioxin, furan, or PCB not detected, an EDL is calculated. The sample specific EDL is an estimate made by the laboratory of the concentration of a given chemical that would have to be present to produce a signal with a peak height of at least 2.5 times the background signal level. The estimate is specific to a particular analysis of the sample and will be affected by sample size, dilution, and so forth. Because of the toxicological significance of dioxins, the EDL value is reported for non-detected chemicals rather than reporting the PQL.

(4) Dioxins shall be reported to the estimated detection limit (EDL). Dioxin toxicity equivalents (TEQ) will be calculated for the 16 dioxin and furan congeners with toxicity equivalent factors (TEFs) defined by the World Health Organization (Van den Berg et al. 2006) substituting half of the EDL for the compounds not detected.

(5) The screening level for m-Xylene is used for m,p-xylene.

(6) According to the laboratory's standard operating procedure (SOP) for organic acid analysis, MDLs and compound sensitivity vary by sample matric, but are generally between a calculated concentration of 0.05 to 0.2 mg/kg in soil.

(7) A total TPH value of 100 mg/kg was used in the Interim Soil Removal Actions Report (ENVIRON 2012) and the Site Management Plan, Revision 1 (SMP) (2013).

(8) Radionuclide MDLs and PQLs are based on minimum detectable activity (MDA) values. The measured values are reported regardless of sample-specific MDA.

(9) Asbestos data will be reported as raw asbestos fiber counts per sample (NDEP 2008). There are no PQLs for this method, but sensitivity is calculated by the concentration of protocol structures per volume of PM10.

Sources:

ENVIRON. 2012. Interim Soil Removal Action , Nevada Environmental Response Trust Site, Henderson, Nevada, August 2010-November 2011. Revised September 2012. NDEP approved December 17, 2012.

ENVIRON. 2013. Site Management Plan, Revision 1, Nevada Environmental Response Trust Site, Henderson, Nevada. October 31.

NDEP. 2008. NDEP. 2008. NDEP Detection Limits and Data Reporting for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada. December.

NDEP. 2010. Letter to Tronox LLC re: Response to: Results of Bioaccessibility Study for Dioxin/Furans in Soil, Tronox LLC, Henderson, Nevada (Revised), Dated May 24, 2010. May 25, 2010.

NDEP. 2011. Technical Guidance for the Calculation of Asbestos Related Risk in Soils for the Basic Management Incorporated (BMI) Complex and Common Areas. February.

NDEP. 2013. User's Guide and Background Technical Document for NDEP Basic Comparison Levels (BCLs) for Human Health for the BMI Complex and Common Areas. Revision 12, August.

Van den Berg et al., 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. May 20.

TABLE 3. SOIL GAS ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Soil Gas Analytes (μg/m^3)									
EPA Method TO-15									
Acetone	67-64-1	4.12E+08	ENVIRON 2013	60	8.98		50	60 - 140	N/A
Acrylonitrile	107-13-1	5.59E+02	ENVIRON 2013	1.1	0.611		50	60 - 140	25
Benzene	71-43-2	6.20E+03	ENVIRON 2013	1.6	0.2597		50	60 - 140	25
Benzyl chloride	100-44-7	1.27E+03	ENVIRON 2013	2.65	0.3783		50	60 - 140	25
Bromodichloromethane	75-27-4	3.19E+03	ENVIRON 2013	3.5	0.011		50	60 - 140	25
Bromoform	75-25-2	2.01E+05	ENVIRON 2013	5.25	0.2214		50	60 - 140	25
Bromomethane	74-83-9	9.97E+04	ENVIRON 2013	1.95	0.3581		50	60 - 140	N/A
1,3-Butadiene	106-99-0	1.47E+03	ENVIRON 2013	1.1	0.5535		50	60 - 140	25
2-Butanone (MEK)	78-93-3	9.02E+07	ENVIRON 2013	75	3.854		50	60 - 140	N/A
Carbon Disulfide	75-15-0	1.07E+07	ENVIRON 2013	1.6	0.4179		50	60 - 140	25
Carbon Tetrachloride	56-23-5	8.82E+03	ENVIRON 2013	3.2	0.0115		50	60 - 140	25
Chlorobenzene	108-90-7	9.95E+05	ENVIRON 2013	2.35	0.1584		50	60 - 140	25
Chloroethane	75-00-3	8.61E+07	ENVIRON 2013	1.34	0.3462		50	60 - 140	25
Chloroform	67-66-3	1.86E+03	ENVIRON 2013	2.45	0.0151		50	60 - 140	25
Chloromethane	74-87-3	2.08E+04	ENVIRON 2013	1.05	0.1218		50	60 - 140	25
Cyclohexane	110-82-7	1.11E+08	ENVIRON 2013	17.5	0.3815		50	60 - 140	N/A
Dibromochloromethane	124-48-1	6.38E+03	ENVIRON 2013	4.35	0.0048		50	60 - 140	25
1,2-Dibromo-3-chloropropane	96-12-8	1.83E+01	ENVIRON 2013	0.123	0.0056		50	60 - 140	25
1,2-Dibromoethane (EDB)	106-93-4	2.61E+02	ENVIRON 2013	3.9	0.0037		50	60 - 140	25
1,2-Dichlorobenzene	95-50-1	4.16E+06	ENVIRON 2013	3.05	0.1645		50	60 - 140	25
1,3-Dichlorobenzene	541-73-1	4.15E+06	ENVIRON 2013	3.05	0.2581		50	60 - 140	25
1,4-Dichlorobenzene	106-46-7	5.29E+03	ENVIRON 2013	3.05	0.6161		50	60 - 140	25
Dichlorodifluoromethane	75-71-8	2.14E+06	ENVIRON 2013	2.5	0.5586		50	60 - 140	25
1,1-Dichloroethane	75-34-3	3.44E+04	ENVIRON 2013	2.05	1.8354		50	60 - 140	25

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Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Soil Gas Analytes (μg/m^3)									
1,2-Dichloroethane	107-06-2	1.65E+03	ENVIRON 2013	2.05	0.0062		50	60 - 140	25
1,1-Dichloroethene	75-35-4	3.40E+06	ENVIRON 2013	2	0.3104		50	60 - 140	25
cis-1,2-Dichloroethene	156-59-2	1.19E+06	ENVIRON 2013	2	0.5626		50	60 - 140	25
trans-1,2-Dichloroethene	156-60-5	1.22E+06	ENVIRON 2013	2	0.2073		50	60 - 140	25
1,2-Dichloropropane	78-87-5	5.28E+03	ENVIRON 2013	2.35	0.0103		50	60 - 140	25
cis-1,3-Dichloropropene	10061-01-5	1.57E+04	ENVIRON 2013	2.3	0.299		50	60 - 140	25
trans-1,3-Dichloropropene	10061-02-6	1.57E+04	ENVIRON 2013	2.3	0.2622		50	60 - 140	25
1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	5.67E+08	ENVIRON 2013	3.55	0.5964		50	60 - 140	25
Diisopropyl ether (DIPE)	108-20-3	1.53E+07	ENVIRON 2013	2.1	0.3496		50	60 - 140	25
1,4-Dioxane	123-91-1	5.49E+03	ENVIRON 2013	1.85	0.1279		50	60 - 140	25
Ethanol	64-17-5	8.34E+08	ENVIRON 2013	96	10.626		50	60 - 140	N/A
Ethyl acetate	141-78-6	1.27E+07	ENVIRON 2013	1.85	0.3645		50	60 - 140	25
Ethyl tert-butyl ether (ETBE)	637-92-3	2.35E+05	ENVIRON 2013	2.1	0.7985		50	60 - 140	25
Ethylbenzene	100-41-4	2.18E+04	ENVIRON 2013	2.2	0.1793		50	60 - 140	25
4-Ethyltoluene	622-96-8	8.72E+06	ENVIRON 2013	2.5	0.0802		50	60 - 140	N/A
Heptane	142-82-5	7.06E+07	ENVIRON 2013	21	5.683		50	60 - 140	N/A
Hexachlorobutadiene	87-68-3	3.12E+03	ENVIRON 2013	5.4	0.1456		50	60 - 140	25
Hexane	110-54-3	7.06E+06	ENVIRON 2013	18	0.4914		50	60 - 140	N/A
2-Hexanone	591-78-6	5.24E+05	ENVIRON 2013	2.1	0.1617		50	60 - 140	25
Methylene chloride	75-09-2	4.37E+06	ENVIRON 2013	1.75	0.4445		50	60 - 140	25
Methyl methacrylate	80-62-6	1.33E+07	ENVIRON 2013	2.08	0.4163		50	60 - 140	25
4-Methyl-2-pentanone (MIBK)	108-10-1	5.80E+07	ENVIRON 2013	2.1	0.1255		50	60 - 140	25
Methyl-t-butyl ether (MTBE)	1634-04-4	1.66E+05	ENVIRON 2013	1.85	0.506		50	60 - 140	25
Naphthalene	91-20-3	1.93E+03	ENVIRON 2013	5.3	0.028		50	60 - 140	25
Styrene	100-42-5	2.03E+07	ENVIRON 2013	2.15	0.2125		50	60 - 140	25

TABLE 3. SOIL GAS ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

						QUALITY CONTROL LIMITS[2]			
				Practical Quantitation Limit	Method Detection Limit	Surrogate	Duplicate	Blank Spike/LCS	
ANALYTES	**CAS Number**	**Screening Level**	**Screening Level Source[1]**	**(PQL)**	**(MDL)**	**%R**	**RPD**	**%R**	**RPD**
Soil Gas Analytes (μg/m^3)									
tert-Amyl methyl ether (TAME	994-05-8	2.35E+05	ENVIRON 2013	2.1	1.247		50	60 - 140	25
t-Butyl alcohol (TBA)	75-65-0	4.92E+08	ENVIRON 2013	31	16.771		50	60 - 140	25
1,1,1,2-Tetrachloroethane	630-20-6	7.69E+03	ENVIRON 2013	3.5	0.00704		50	60 - 140	25
1,1,2,2-Tetrachloroethane	79-34-5	9.78E+02	ENVIRON 2013	3.5	0.00765		50	60 - 140	25
Tetrachloroethene	127-18-4	2.17E+05	ENVIRON 2013	3.45	0.0077		50	60 - 140	25
Tetrahydrofuran	109-99-9	3.64E+07	ENVIRON 2013	1.5	0.2068		50	60 - 140	25
Toluene	108-88-3	8.70E+07	ENVIRON 2013	1.9	0.2566		50	60 - 140	25
1,2,4-Trichlorobenzene	120-82-1	8.39E+04	ENVIRON 2013	3.75	0.1731		50	60 - 140	25
1,1,1-Trichloroethane	71-55-6	9.45E+07	ENVIRON 2013	2.75	0.3454		50	60 - 140	25
1,1,2-Trichloroethane	79-00-5	3.30E+03	ENVIRON 2013	2.75	0.0121		50	60 - 140	25
Trichloroethene	79-01-6	1.28E+04	ENVIRON 2013	2.75	0.0412		50	60 - 140	25
Trichlorofluoromethane	75-69-4	1.22E+07	ENVIRON 2013	2.85	0.3579		50	60 - 140	N/A
1,1,2-Trichloro trifluoroethane (Freon 113)	76-13-1	5.67E+08	ENVIRON 2013	3.9	0.1558		50	60 - 140	25
1,2,4-Trimethylbenzene	95-63-6	1.61E+05	ENVIRON 2013	2.5	0.2508		50	60 - 140	25
1,3,5-Trimethylbenzene	108-67-8	1.62E+05	ENVIRON 2013	2.5	0.35		50	60 - 140	N/A
Vinyl Acetate	108-05-4	3.54E+06	ENVIRON 2013	1.8	0.6113		50	60 - 140	N/A
Vinyl Chloride	75-01-4	9.60E+03	ENVIRON 2013	1.3	0.0075		50	60 - 140	25
Xylenes, Total	1330-20-7	1.91E+06	ENVIRON 2013	6.6	0.8331		50	60 - 140	25
1,2-Dichloroethane-D4 (Surr)	17060-07-0	--	ENVIRON 2013	--	--	60 - 140			
Toluene-d8 (Surr)	2037-26-5	--	ENVIRON 2013	--	--	60 - 140			
4-Bromofluorobenzene (Surr)	460-00-4	--	ENVIRON 2013	--	--	60 - 140			
EPA Method SW8260B									
N-Butylbenzene	104-51-8	9.69E+06	ENVIRON 2013	500	500		50		200,000
sec-Butylbenzene	135-98-8	9.60E+06	ENVIRON 2013	500	500		50		200,000
tert-Butylbenzene	98-06-6	9.69E+06	ENVIRON 2013	500	500		50		200,000

TABLE 3. SOIL GAS ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source(1)	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS(2) Surrogate %R	Duplicate RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Soil Gas Analytes (μg/m^3)									
Isopropylbenzene	98-82-8	8.72E+06	ENVIRON 2013	500	500		50		200,000
4-Isopropyltoluene	99-87-6	9.69E+06	ENVIRON 2013	500	500		50		200,000
N-Propylbenzene	103-65-1	9.28E+06	ENVIRON 2013	500	500		50		200,000

Notes:

Shaded PQLs and MDLs exceed the lowest screening criteria.

μg/m^3 = micrograms per cubic meter

N/A = not available

Surr = Surrogate

(1) ENVIRON derived risk-based concentrations (RBCs) using the inputs to the Johnson and Ettinger model and values for exposure assumptions and toxicity criteria presented in the NDEP-approved Soil Gas Investigation and Human Health Risk Assessment Work Plan for Parcels C, D, F, G, and H (ENVIRON 2013).

(2) QC Limits = Quality Control Limits for %R (Percent Recovery) of spiked compounds in Laboratory Control Samples (LCS) and surrogate compounds and Relative Percent Difference (RPD) between LCS and LCS Duplicate (LCSD) samples. Matrix spikes (MS) are not performed on soil gas samples. Laboratory historical control limits are subject to change as a result of periodic re-evaluation. Limits in use at the time of sample analysis are available from the laboratory.

Sources:

ENVIRON. 2013. Soil Gas Investigation and Human Health Risk Assessment Work Plan for Parcels C, D, F, G, and H. Nevada Environmental Response Trust, Henderson, Nevada. March 18, 2013. Approved by NDEP April 9, 2013.

TABLE 4. SOIL LEACHING ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source(1)	Reporting Limit (RL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS(2) Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Metals (mg/kg)											
EPA Method 200.7 / 6010B											
Aluminum	7429-90-5	75	BCL	10	5.0		50	75 - 125	20	80 - 120	20
Barium	7440-39-3	82	BCL	1.5	0.75		50	75 - 125	20	80 - 120	20
Boron	7440-42-8	23	BCL	5.0	2.5		50	75 - 125	20	80 - 120	20
Cadmium	7440-43-9	0.40	BCL	0.5	0.25		50	75 - 125	20	80 - 120	20
Chromium (total)	7440-47-3	180,000	RSL	1.0	0.50		50	75 - 125	20	80 - 120	20
Cobalt	7440-48-4	0.50	BCL	1.0	0.50		50	75 - 125	20	80 - 120	20
Copper	7440-50-8	46	BCL	2.0	1.0		50	75 - 125	20	80 - 120	20
Iron	7439-89-6	7.6	BCL	10	5.0		50	75 - 125	20	80 - 120	20
Lead	7439-92-1	14	RSL	2.0	1.0		50	75 - 125	20	80 - 120	20
Magnesium	7439-95-4	973	BCL	10	5.0		50	75 - 125	20	80 - 120	20
Manganese	7439-96-5	1.3	BCL	2.0	1.0		50	75 - 125	20	80 - 120	20
Molybdenum	7439-98-7	3.7	BCL	2.0	1.0		50	75 - 125	20	80 - 120	20
Nickel	7440-02-0	7.0	BCL	2.0	1.0		50	75 - 125	20	80 - 120	20
Silver	7440-22-4	0.85	BCL	1.5	0.75		50	75 - 125	20	80 - 120	20
Strontium	7440-24-6	330	RSL	5.0	2.5		50	75 - 125	20	80 - 120	20
Tungsten	7440-33-7	41	BCL	10	5.0		50	75 - 125	20	80 - 120	20
Zinc	7440-66-6	620	BCL	5.0	2.5		50	75 - 125	20	80 - 120	20
Zirconium	7440-67-7	3.7	RSL				50	75 - 125	20	80 - 120	20
EPA Method 7199											
Chromium (hexavalent)	18540-29-9	2.0	BCL	0.80	0.15		50	55 - 110	20	65 - 110	20
EPA Method 200.8 / 6020											
Antimony	7440-36-0	0.30	BCL	1	0.50		50	80 - 120	20	80 - 120	20
Arsenic	7440-38-2	0.29	RSL	0.50	0.25		50	80 - 120	20	80 - 120	20
Selenium	7782-49-2	0.30	BCL	1.0	0.50		50	80 - 120	20	80 - 120	20
Thallium	7440-28-0	0.40	BCL	1	5.0		50	80 - 120	20	80 - 120	20

TABLE 4. SOIL LEACHING ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

						QUALITY CONTROL LIMITS[2]					
		Screening	Screening Level	Reporting Limit	Method Detection Limit	Surrogate	Duplicate	Matrix Spike		Blank Spike/LCS	
ANALYTES	**CAS Number**	**Level**	**Source[1]**	**(RL)**	**(MDL)**	**%R**	**RPD**	**%R**	**RPD**	**%R**	**RPD**
EPA Method 7471A											
Mercury	7439-97-6	0.10	BCL	0.020	0.0120		50	70 - 130	20	80 - 120	20
EPA Method 6020A											
Niobium	7440-03-1	1.3	BCL	2.5	0.380		50	75 - 125	30	80 - 120	20
Palladium	7440-05-3	--	--	0.10	0.0110		50	75 - 125	30	80 - 120	20
Volatile Organic Compounds (µg/kg)											
EPA Method 8260B											
Benzene	71-43-2	2.0	BCL	1.0	0.50		50	65 - 130	20	65 - 120	20
2-Butanone	78-93-3	1000	RSL	10.0	5.0		50	25 - 170	40	40 - 145	35
Carbon tetrachloride	56-23-5	3.0	BCL	2.0	0.50		50	60 - 145	25	65 - 140	20
Chlorobenzene	108-90-7	70	BCL	1.0	0.50		50	70 - 130	25	75 - 120	20
Chloroform	67-66-3	30	BCL	1.0	0.50		50	65 - 135	20	70 - 130	20
1,2-Dichlorobenzene	95-50-1	900	BCL	1.0	0.50		50	70 - 130	25	75 - 120	20
1,4-Dichlorobenzene	106-46-7	100	BCL	1.0	0.50		50	70 - 130	25	75 - 120	20
1,2-Dichloroethane	107-06-2	1.0	BCL	1.0	0.50		50	60 - 150	25	60 - 140	20
1,1-Dichloroethene	75-35-4	3.0	BCL	2.0	0.50		50	65 - 135	25	70 - 125	20
1,1-Dichloropropene	563-58-6	--	--	1.0	0.50		50	65 - 135	20	70 - 130	20
Ethyl tert-butyl ether	637-92-3	--	--	2.0	1.0		50	60 - 145	30	60 - 140	20
Methylene chloride	75-09-2	1.0	BCL	10.0	5.0		50	55 - 145	25	55 - 135	20
Tetrachloroethene	127-18-4	3.0	BCL	1.0	0.50		50	65 - 135	25	70 - 125	20
1,2,3-Trichlorobenzene	87-61-6	15	RSL	2.0	1.0		50	45 - 145	30	60 - 130	20
Trichloroethene	79-01-6	3.0	BCL	1.0	0.50		50	65 - 140	25	70 - 125	20
1,2,4-Trimethylbenzene	95-63-6	21	RSL	2.0	1.0		50	65 - 140	25	70 - 125	20
4-Bromofluorobenzene (Surr)	460-00-4	--	--	--	--	79 - 120					
Dibromofluoromethane (Surr)	1868-53-7	--	--	--	--	60 - 120					
Toluene-d8 (Surr)	2037-26-5	--	--	--	--	79 - 123					

TABLE 4. SOIL LEACHING ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Reporting Limit (RL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
EPA Method 8260B SIM											
1,2,3-Trichloropropane	96-18-4	0.00028	RSL	0.010	0.0040		50	50 - 150	30	60 - 135	25
1,4-Dioxane	123-91-1	0.14	RSL	5.0	1.1		50	70 - 130	30	70 - 130	30
Dibromofluoromethane (Surr)	1868-53-7	--	--	--	--	80 - 125					
Semi-volatile Organic Compounds (mg/kg)											
EPA Method 8270C											
Dimethylphthalate	131-11-3	--	--	0.33	0.067		50	45 - 125	25	50 - 125	20
Dibenzofuran	132-64-9	0.11	RSL	0.33	0.067		50	50 - 120	25	55 - 120	20
1-Methylnaphthalene	90-12-0	0.0051	RSL	0.35	0.15		50	60 - 140	30	60 - 140	30
2-Methylnaphthalene	91-57-6	0.14	RSL	0.33	0.07		50	40 - 120	20	45 - 120	20
Octachlorostyrene	29082-74-4	--	--	3.3	2.3		50	60 - 140	30	60 - 140	30
Hexachlorobenzene	118-74-1	0.10	BCL	0.33	0.07		50	50 - 120	25	50 - 120	20
2-Fluorophenol (Surr)	367-12-4	--	--	--	--	35 - 120					
2,4,6-Tribromophenol (Surr)	118-79-6	--	--	--	--	35 - 120					
Nitrobenzene-d5 (Surr)	4165-60-0	--	--	--	--	35 - 120					
Terphenyl-d14 (Surr)	1718-51-0	--	--	--	--	35 - 120					
Phenol-d6 (Surr)	13127-88-3	--	--	--	--	35 - 120					
Polycyclic Aromatic Hydrocarbons (mg/kg)											
EPA Method 8270 SIM											
Acenaphthylene	208-96-8	0.0106	CAL	0.030	0.0040		50	45 - 120	20	50 - 120	20
Benzo(a)anthracene	56-55-3	0.080	BCL	0.030	0.0040		50	50 - 120	25	55 - 120	20
Benzo(a)pyrene	50-32-8	0.40	BCL	0.030	0.0040		50	45 - 125	25	50 - 125	20
Benzo(b)fluoranthene	205-99-2	0.20	BCL	0.030	0.0040		50	45 - 125	30	45 - 125	25
Benzo(g,h,i)perylene	191-24-2	--	--	0.030	0.0040		50	25 - 130	30	35 - 130	25
Indeno(1,2,3-cd)pyrene	193-39-5	0.70	BCL	0.030	0.0040		50	20 - 130	30	30 - 135	25
Phenanthrene	85-01-8	0.024	CAL	0.030	0.0040		50	50 - 120	25	50 - 120	20

TABLE 4. SOIL LEACHING ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source(1)	Reporting Limit (RL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS(2) Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
2-Fluorobiphenyl (Surr)	321-60-8	--	--			35 - 120					
Organophosphorus Pesticides (mg/kg)											
EPA Method 8141A											
Dimethoate	60-51-5	0.00070	RSL	0.022	0.00708		50	25 - 138	98	25 - 138	98
Stirphos	22248-79-9	--	--	0.015	0.00436		50	44 - 118	24	44 - 118	24
Organochlorine Pesticides (mg/kg)											
EPA Method 8081A											
alpha-BHC	319-84-6	0.029	BCL	0.0050	0.0015		50	40 - 115	30	60 - 115	30
beta-BHC	319-85-7	0.006	BCL	0.0050	0.0015		50	40 - 120	30	60 - 115	30
gamma-BHC	58-89-9	0.00050	BCL	0.0050	0.0015		50	40 - 120	30	55 - 115	30
2,4'-DDE	3424-82-6	--	--	0.0050	0.0015		50	35 - 130	30	60 - 120	30
4,4'-DDE	72-55-9	3	BCL	0.0050	0.0015		50	35 - 130	30	60 - 120	30
4,4'-DDT	50-29-3	2	BCL	0.0050	0.0015		50	35 - 130	30	65 - 120	30
Dieldrin	60-57-1	0.00020	BCL	0.0050	0.0015		50	40 - 125	30	65 - 115	30
Endosulfan I	959-98-8	--	--	0.0050	0.0015		50	40 - 120	30	40 - 120	30
Endosulfan sulfate	1031-07-8	--	--	0.010	0.002		50	45 - 120	30	65 - 115	30
Endrin ketone	53494-70-5	--	--	0.0050	0.002		50	40 - 120	30	65 - 115	30
Decachlorobiphenyl (Surr)	2051-24-3	--	--	--	--	45 - 120					
Dioxin/Furans (µg/kg) (4)											
EPA Method 8290											
2,3,7,8-Tetrachloro dibenzo-p-dioxin	1746-01-6	0.015	RSL	0.001	EDL(3)		50	60 - 138	20	60 - 138	20
1,2,3,7,8-PeCDD	40321-76-4	--	--	0.005	EDL(3)		50	70 - 122	20	70 - 122	20
1,2,3,4,7,8-HxCDD(6)	39227-28-6	--	--	0.005	EDL(3)		50	60 - 138	20	60 - 138	20
1,2,3,6,7,8-HxCDD(6)	57653-85-7	--	--	0.005	EDL(3)		50	68 - 136	20	68 - 136	20
1,2,3,7,8,9-HxCDD(6)	19408-74-3	0.015	RSL	0.005	EDL(3)		50	68 - 138	20	68 - 138	20
1,2,3,4,6,7,8-HpCDD	35822-46-9	--	--	0.005	EDL(3)		50	71 - 128	20	71 - 128	20

TABLE 4. SOIL LEACHING ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Reporting Limit (RL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
OCDD	3268-87-9	--	--	0.01	EDL[3]		50	70 - 128	20	70 - 128	20
2,3,7,8-TCDF	51207-31-9	--	--	0.001	EDL[3]		50	56 - 158	20	56 - 158	20
1,2,3,7,8-PeCDF	57117-41-6	--	--	0.005	EDL[3]		50	69 - 134	20	69 - 134	20
2,3,4,7,8-PeCDF	57117-31-4	--	--	0.005	EDL[3]		50	70 - 131	20	70 - 131	20
1,2,3,4,7,8-HxCDF	70648-26-9	--	--	0.005	EDL[3]		50	74 - 128	20	74 - 128	20
1,2,3,6,7,8-HxCDF	57117-44-9	--	--	0.005	EDL[3]		50	67 - 140	20	67 - 140	20
1,2,3,7,8,9-HxCDF	72918-21-9	--	--	0.005	EDL[3]		50	72 - 134	20	72 - 134	20
2,3,4,6,7,8-HxCDF	60851-34-5	--	--	0.005	EDL[3]		50	71 - 137	20	71 - 137	20
1,2,3,4,6,7,8-HpCDF	67562-39-4	--	--	0.005	EDL[3]		50	71 - 134	20	71 - 134	20
1,2,3,4,7,8,9-HpCDF	55673-89-7	--	--	0.005	EDL[3]		50	68 - 129	20	68 - 129	20
OCDF	39001-02-0	--	--	0.01	EDL[3]		50	63 - 141	20	63 - 141	20
Polychlorinated Biphenyls (µg/kg)											
EPA Method 8082											
Aroclor-1260	11096-82-5	24	RSL	50	17		50	50 - 125	30	65 - 115	30
EPA Method 1668A											
3,4,4',5-TeCB	70362-50-4	0.27	RSL	0.0020	EDL[3]		50	50 - 150	50	50 - 150	50
2,3',4,4',5-PeCB	31508-00-6	4.4	RSL	0.0020	EDL[3]		50	50 - 150	50	50 - 150	50
3,3',4,4',5-PeCB	57465-28-8	0.0013	RSL	0.0020	EDL[3]		50	50 - 150	50	50 - 150	50
3,3',4,4',5,5'-HxCB	32774-16-6	0.0072	RSL	0.0020	EDL[3]		50	50 - 150	50	50 - 150	50
DeCB3	2051-24-3	78	RSL	0.020	EDL[3]		50	50 - 150	50	50 - 150	50
Total PCBs	1336-36-3	78	RSL	0.20	EDL[3]		50				
Organic Acids (mg/kg)											
Organic Acid Analysis											
Phthalic acid	88-99-3	--	--	0.5	0.05-0.2[5]		50	35 - 143	20	61 - 130	

TABLE 4. SOIL LEACHING ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

						QUALITY CONTROL LIMITS[2]					
			Screening Level	Reporting Limit	Method Detection Limit	Surrogate	Duplicate	Matrix Spike		Blank Spike/LCS	
ANALYTES	CAS Number	Screening Level	Source[1]	(RL)	(MDL)	%R	RPD	%R	RPD	%R	RPD
Total Petroleum Hydrocarbons (mg/kg)											
EPA Method 8015B											
Total petroleum hydrocarbon-gasoline	TPH-gasoline	--	--	0.4	0.15		50	60 - 140	30	70 - 135	20
4-Bromofluorobenzene (Surr)	460-00-4	--	--	--	--	65 - 140					
Oil Range Organics	TPH-MOTOR	--	--	5.00	2.50		50	40 - 120	30	45 - 115	25
Total petroleum hydrocarbon-diesel	TPH-diesel	--	--	5.00	2.50		50	40 - 120	30	45 - 115	25
Others (mg/kg)											
SM 2320B											
Carbonate (as CO_3)	--	--	--	300	0		50				
SM 4500-NH3 D											
Ammonia as NH_3	7664-41-7	--	--	12.0	2.40		50	75 - 125	15	85 - 115	15
EPA Method 300.0											
Bromide	24959-67-9	--	--	5.00	3.50		50	80 - 120	20	90 - 110	20
Chloride	16887-00-6	--	--	5.00	4.00		50	80 - 120	20	90 - 110	20
Nitrate	14797-55-8	7.0	BCL	1.10	0.800		50	80 - 120	20	90 - 110	20
Nitrite	14797-65-0	--	--	1.50	1.10		50	80 - 120	20	90 - 110	20
Ortho-Phosphate as P	7723-14-0	0.0011	RSL	1.60	1.30		50	80 - 120	20	90 - 110	20
Ortho-Phosphate as PO_4	14265-44-2	--	--	5.00	4.00		50	80 - 120	20	90 - 110	20
Sulfate	14808-79-8	--	--	5.00	4.00		50	80 - 120	20	90 - 110	20
EPA Method 300.1											
Chlorate	7790-93-4	--	--	0.2	0.05		50	75 - 125	25	75 - 125	25
Dichloroacetic acid (Surr)	79-43-6	--	--	--	--	90 - 115					
EPA Method 8315A											
Formaldehyde	50-00-0	0.62	RSL	1.00	0.600		50	50 - 150	20	50 - 150	20
EPA Method 314.0											
Perchlorate	14797-73-0	0.019	BCL	0.0400	0.00950		50	80 - 120	20	85 - 115	15

TABLE 4. SOIL LEACHING ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Reporting Limit (RL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
EPA Method 200.7 / 6010B											
Silicon	7440-21-3	--	--	10.0	5.00		50	75 - 125	20	80 - 120	20
EPA Method 6020A											
Sulfur	7704-34-9	--	--	500	81.1		50	75 - 125	30	80 - 120	20
Radionuclides (pCi/g)[7]											
See Table 1 for Individual Methods											
Radium-226	13982-63-3	0.016	RAD	1	1		50				
Radium-228	15262-20-1	0.016	RAD	1	1		50				
Thorium-228	14274-82-9	0.11	BCL	1	1		50				
Thorium-230	14269-63-7	0.042	BCL	1	1		50				
Thorium-232	7440-29-1	0.14	BCL	1	1		50				
Uranium (mg/kg)	U-Total	13.50	BCL	0.1	0.1		50				
Uranium-234	13966-29-5	0.012	RAD	1	1		50				
Uranium-235	15117-96-1	0.012	RAD	1	1		50				
Uranium-238	7440-61-1	0.012	RAD	1	1		50				

Notes:

Shaded PQLs and MDLs exceed the lowest screening criteria.

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

pCi/g = picoCurie per gram

Surr = Surrogate

EPA = United States Environmental Protection Agency

SM = Standard Method

(1) Soil screening levels were selected according to the following hierarchy of criteria:
(a) Basic Comparison Level (BCL): Leaching-based basic comparison levels (LBCL) with dilution attenuation factor (DAF) of 1 in the most recent version of Nevada Division of Environmental Protection (NDEP) documents (August 2013 for non-radionuclides and April 2009 for radionuclides).
(b) Regional Screening Level (RSL): United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSL) for groundwater protection (May 2013), with the maximum contaminant level (MCL) based screening levels selected over the risk-based screening levels, if available (USEPA 2013a).
(c) Radiation Criteria (RAD): USEPA Screening criteria from Soil Screening Guidance for Radionuclides: User's Guide, 2000 (USEPA 2013b).
(d) Calculated Criteria (CAL): Generic leaching-based BSLs (LBCLs) calculated using the approach presented in NDEP guidance (NDEP 2013).
All other individual or grouped dioxins or furans don't have screening levels.
All other individual or grouped PCBs use MCL-based screening levels for low risk PCBs in RSL table.

(2) QC Limits = Quality Control Limits for %R (Percent Recovery) of spiked compounds in Laboratory Control Samples (LCS) and surrogate compounds and Relative Percent Difference (RPD) between Matrix Spike (MS) and MS Duplicate (MSD) samples and LCS and LCS duplicate (LCSD) samples. Laboratory historical control limits are subject to change as a result of periodic re-evaluation. Limits in use at the time of sample analysis are available from the laboratory.

(3) EDL = Estimated Detection Limit. For each dioxin, furan, or PCB not detected, an EDL is calculated. The sample specific EDL is an estimate made by the laboratory of the concentration of a given chemical that would have to be present to produce a signal with a peak height of at least 2.5 times the background signal level. The estimate is specific to a particular analysis of the sample and will be affected by sample size, dilution, and so forth. Because of the toxicological significance of dioxins, the EDL value is reported for non-detected chemicals rather than reporting the PQL.

(4) Dioxins should be reported to the estimated detection limit (EDL). Dioxin toxicity equivalents (TEQ) will be calculated for the 16 dioxin and furan congeners with toxicity equivalent factors (TEFs) defined by the World Health Organization (Van den Berg et al. 2006) substituting half the EDL for the compounds not detected.

(5) According to the laboratory's standard operating procedure (SOP) for organic acid analysis, MDLs and compound sensitivity vary by sample matric, but are generally between a calculated concentration of 0.05 to 0.2 mg/kg in soil.

(6) The total hexachlorodibenzo-p-dioxin (HxCDD) will be compared to an RSL of 0.015 µg/kg.

(7) Radionuclide MDLs and PQLs are based on minimum detectable activity (MDA) values. The measured values are reported regardless of sample-specific MDA.

Sources:

NDEP. 2009b. Guidance for Evaluating Radionuclide Data, BMI Plant Sites and Common Areas Projects, Henderson, Nevada. February 6.

NDEP. 2013. User’s Guide and Background Technical Document for NDEP Basic Comparison Levels (BCLs) for Human Health for the BMI Complex and Common Areas. Revision 12, August.

USEPA. 2013a. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. November.

USEPA. 2013b. Preliminary Remediation Goals for Radionuclides. On-line calculator. http://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search

Van den Berg et al. 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. May 20.

TABLE 5. GROUNDWATER ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

						QUALITY CONTROL LIMITS[2]					
				Practical Quantitation Limit	Method Detection Limit	Surrogate	Duplicate	Matrix Spike		Blank Spike/LCS	
ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	(PQL)	(MDL)	%R	RPD	%R	RPD	%R	RPD
Metals (µg/L)											
EPA Method 200.7 / 6010B											
Aluminum	7429-90-5	50	BCL	50	25		30	75 - 125	20	80 - 120	20
Boron	7440-42-8	7,300	BCL	50	25		30	75 - 125	20	80 - 120	20
Chromium (total)	7440-47-3	100	MCL	5	2		30	75 - 125	20	80 - 120	20
Cobalt	7440-48-4	11	BCL	10	2		30	75 - 125	20	80 - 120	20
Iron	7439-89-6	300	BCL	40	20		30	75 - 125	20	80 - 120	20
Lead	7439-92-1	15	MCL	5	4		30	75 - 125	20	80 - 120	20
Magnesium	7439-95-4	207,000	BCL	20	10		30	75 - 125	20	80 - 120	20
Manganese	7439-96-5	20	BCL	20	7.0		30	75 - 125	20	80 - 120	20
Strontium	7440-24-6	21,900	BCL	20	5.0		30	75 - 125	20	80 - 120	20
Tungsten	7440-33-7	274	BCL	1000	500		30	75 - 125	20	80 - 120	20
EPA Method 200.8 / 6020											
Arsenic	7440-38-2	10	MCL	1.0	0.50		30	75 - 125	20	80 - 120	20
EPA Method 7199											
Chromium (hexavalent)	18540-29-9	100	BCL	1	0.25		30	90 - 110	10	90 - 110	10
Volatile Organic Compounds (µg/L)											
EPA Method 8260B											
Benzene	71-43-2	5	MCL	0.50	0.25		30	66 - 130	20	68 - 130	20
Bromodichloromethane	75-27-4	0.117	BCL	0.50	0.25		30	70 - 138	20	70 - 132	20
Bromoform	75-25-2	8.51	BCL	1.0	0.25		30	59 - 150	25	60 - 148	25
Carbon tetrachloride	56-23-5	5	MCL	0.50	0.25		30	60 - 150	25	60 - 150	25
Chlorobenzene	108-90-7	100	MCL	0.50	0.25		30	70 - 130	20	70 - 130	20
Chloroform	67-66-3	0.193	BCL	0.50	0.25		30	70 - 130	20	70 - 130	20
Chloromethane	74-87-3	2.7	BCL	0.50	0.25		30	39 - 144	25	47 - 140	25
Dibromochloromethane	124-48-1	0.147	BCL	0.50	0.25		30	70 - 148	25	69 - 145	20
1,2-Dichlorobenzene	95-50-1	600	MCL	0.50	0.50		30	70 - 130	20	70 - 130	20

TABLE 5. GROUNDWATER ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate	Duplicate	Matrix Spike		Blank Spike/LCS	
						%R	RPD	%R	RPD	%R	RPD
1,4-Dichlorobenzene	106-46-7	75	MCL	0.50	0.25		30	70 - 130	20	70 - 130	20
1,1-Dichloroethane	75-34-3	2.42	BCL	0.50	0.25		30	65 - 130	20	64 - 130	20
1,2-Dichloroethane	107-06-2	5	MCL	0.50	0.25		30	56 - 146	20	57 - 138	20
1,1-Dichloroethene	75-35-4	7	MCL	0.50	0.25		30	70 - 130	20	70 - 130	20
Methylene chloride	75-09-2	5	MCL	2.0	0.88		30	52 - 130	20	52 - 130	20
Tetrachloroethene	127-18-4	5	MCL	0.50	0.25		30	70 - 137	20	70 - 130	20
Trichloroethene	79-01-6	5	MCL	0.50	0.25		30	70 - 130	20	70 - 130	20
4-Bromofluorobenzene (Surr)	460-00-4	--	--			80 - 120					
Dibromofluoromethane (Surr)	1868-53-7	--	--			76 - 132					
EPA Method 8260B SIM											
1,2,3-Trichloropropane	96-18-4	0.00224	BCL	0.005	0.0035		30	55 - 135	30	60 - 130	20
1,4-Dioxane	123-91-1	0.672	BCL	2.0	0.5		30	70 - 130	30	70 - 125	30
Dibromofluoromethane (Surr)	1868-53-7	--	--	--	--	80 - 120					
Semi Volatile Organic Compounds (µg/L)											
EPA Method 625											
bis(2-Ethylhexyl)phthalate	117-81-7	6	MCL	5.0	2.0		30	65 - 130	25	57 - 124	20
Organochlorine Pesticides (µg/L)											
EPA Method 608											
alpha-BHC	319-84-6	11	BCL	0.0050	0.0025		30	40 - 120	30	45 - 115	30
Heptachlor epoxide	1024-57-3	0.2	MCL	0.0050	0.0025		30	50 - 120	30	55 - 115	30
Organic Acids (µg/L)											
Organic Acid Analysis											
4-Chlorobenzenesulfonic acid	98-66-8	36,500	BCL	50	5-20[3]		30	60 - 134	20	70 - 130	

TABLE 5. GROUNDWATER ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Others (µg/L)											
SM 4500-NH3 D											
Ammonia	7664-41-7	209	BCL	1200	240		30	75 - 125	15	85 - 115	15
EPA Method 300.0											
Bromide	24959-67-9	--	--	500	250		30	80 - 120	20	90 - 110	20
Chloride	16887-00-6	250,000	2nd MCL	500	250		30	80 - 120	20	90 - 110	20
Nitrate	14797-55-8	10,000	MCL	110	55		30	80 - 120	20	90 - 110	20
Nitrite	14797-65-0	1,000	MCL	150	70		30	80 - 120	20	90 - 110	20
Sulfate	14808-79-8	250,000	2nd MCL	500	250		30	80 - 120	20	90 - 110	20
Orthophosphate as PO_4	14265-44-2	--	--	500	250		30	80 - 120	20	90 - 110	20
EPA Method 314.0											
Perchlorate	14797-73-0	18	BCL	4	0.95		30	80 - 120	20	85 - 115	15
EPA Method 300.1											
Chlorate	7790-93-4	--	--	20	8		30	75 - 125	25	75 - 125	25
EPA Method 9014B											
Cyanide (total)	57-12-5	200	MCL	25	17		30	70 - 115	15	90 - 110	10
EPA Method 365.3											
Phosphorus (total)	7723-14-0	0.73	BCL	0.05	0.050		30	75 - 125	20	80 - 120	20
SM 2540C											
Total Dissolved Solids	10-33-3	500,000	2nd MCL	10000	5000		30			90 - 110	10
Radionuclides (pCi/L)											
See Table 1 for Individual Methods											
Radium (226+228)	R226+228	5.0	MCL	1	1		30				
Thorium-228	14274-82-9	0.11	Other	1	1		30				
Thorium-230	14269-63-7	0.042	Other	1	1		30				
Thorium-232	7440-29-1	0.14	Other	1	1		30				

TABLE 5. GROUNDWATER ANALYTES AND ANALTICAL QUALITY CONTROL CRITERIA
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust Site; Henderson, Nevada

ANALYTES	CAS Number	Screening Level	Screening Level Source[1]	Practical Quantitation Limit (PQL)	Method Detection Limit (MDL)	QUALITY CONTROL LIMITS[2] Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike/LCS %R	Blank Spike/LCS RPD
Uranium (µg/L)	U-Total	30	MCL	1	1		30				
Uranium-238	7440-61-1	10.1	Other	1	1		30				

Notes:

Shaded PQLs and MDLs exceed the lowest screening criteria.

µg/L = micrograms per liter
pCi/L = picoCurie per liter

(1) Groundwater screening levels were selected according to the following hierarchy of criteria:
- (a) Maximum Contaminant Level (MCL): Primary United States Environmental Protections Agency (USEPA) maximum contaminant level (USEPA 40 CFR Part 141).
- (b) Basic Contaminant Level (BCL): Residential water basic comparison levels in NDEP August 2013 BCL Spreadsheet (NDEP 2013).
- (c) Regional Screening Level (RSL): Tap water regional screening levels in USEPA Pacific Southwest, Region 9, Regional Screening Levels Chemical Specific Parameters table, Nov 2013. The screening levels were selected as the minimal values of carcinogenic screening level and noncarcinogenic screening level (USEPA 2013a).
- (d) 2nd Maximum Contaminant Level (2nd MCL): National Secondary Drinking Water Regulations (USEPA, 40 CFR Part 143).
- (e) Other criteria for radionuclides, including target activities for radium and thorium isotopes (NDEP, 2009) and for uranium isotopes (USEPA 2013b).

(2) QC Limits = Quality Control Limits for %R (Percent Recovery) of spiked compounds in Laboratory Control Samples (LCS) and surrogate compounds and Relative Percent Difference (RPD) between Matrix Spike (MS) and MS Duplicate (MSD) samples and LCS and LCS duplicate (LCSD) samples. Laboratory historical control limits are subject to change as a result of periodic re-evaluation. Limits in use at the time of sample analysis are available from the laboratory.

(3) According to the laboratory's standard operating procedure (SOP) for organic acid analysis, MDLs and compound sensitivity vary by sample matric, but are generally between a calculated concentration of 5 to 20 µg/L in water.

Sources:

NDEP. 2009b. Guidance for Evaluating Radionuclide Data, BMI Plant Sites and Common Areas Projects, Henderson, Nevada. February 6.

NDEP. 2013. User's Guide and Background Technical Document for NDEP Basic Comparison Levels (BCLs) for Human Health for the BMI Complex and Common Areas. Revision 12, August.

USEPA. 2013a. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. November.

USEPA. 2013b. Preliminary Remediation Goals for Radionuclides. On-line calculator. http://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search

USEPA. National Primary Drinking Water Regulations. Code of Federal Regulations, 40 CFR Part 141.

USEPA. National Secondary Drinking Water Regulations. Code of Federal Regulations, 40 CFR Part 143.

TABLE 6. FREQUENCY OF QA/QC SAMPLES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

SAMPLE TYPE	FREQUENCY OF ANALYSIS
Contamination Control Samples	
Laboratory Method Blank	One per each analytical method. One in every batch of samples (not to exceed 20 samples).
Trip Blank	One per cooler/shipment if VOCs are tested; analyze for VOCs only.
Equipment Blank	One per each analytical method. One in every batch of samples (not to exceed 20 samples).
Field Blank	One per each analytical method. One in every batch of samples (not to exceed 20 samples).
Accuracy Control Samples	
Performance or Blind Check Samples	One per each analytical method. One in every batch of samples (not to exceed 20 samples).
Laboratory Control Samples	One per each analytical method. One in every batch of samples (not to exceed 20 samples).
Surrogate Spiked Samples	For methods that use surrogate(s), the surrogate(s) will be spiked and analyzed in all samples and in all blanks.(1)
Matrix Spike Samples(2)	One per 20 samples.
Precision Control Samples	
Field Replicate (Duplicate) Sample	One per each analytical method. One in every batch of samples (not to exceed 10 samples).
Laboratory Control Sample Duplicates	One per each analytical method. One in every batch of samples (not to exceed 20 samples).
Matrix Spike Duplicate Samples(2)	One per 20 samples.

NOTE:

(1) Not all methods use surrogates. See Tables 2, 3, 4, and 5 for specific surrogates to be used.

(2) Matrix spikes and spike duplicates are analyzed in Laboratory Control Samples (one per every batch of 20 samples tested). Matrix Spikes are not used for soil gas samples.

TABLE 7. SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

MATRIX	ANALYTES	ANALYTICAL METHOD	PRESERVATION	CONTAINER(1)(2)	TAT	HOLD TIME(3) Prior to Extraction	After Extraction
Water	Volatile Organic Compounds (VOCs)	EPA Method 8260B	HCl to pH <2; no headspace; cool 4 ˚C	3 x 40 mL glass vials with Teflon-lined septum caps	10d	14d	
Water	Semivolatile Organic Compounds (SVOCs)	EPA Method 625	4 °C	2 x 1 L amber glass with Teflon-lined lids	10d	7d	40d
Water	Volatile Organic Acid	Organic Acid Analysis	4 °C	2 x 40 mL glass vials with Teflon-lined septum capsastic	10d	28d	
Water	Organochlorine Pesticides	EPA Method 608	4 °C	2 x 1 L amber glass with Teflon-lined lids	10d	7d	40d
Water	Organophosphorus Pesticides	EPA Method 8141A	4 °C	2 x 1 L amber glass with Teflon-lined lids	11d	7d	40d
Water	Metals	EPA Method 200.7 / 6010B	HNO_3 to pH <2; 4 ˚C	500 mL plastic	10d	180d	
Water	Metals	EPA Method 200.8 / 6020	HNO_3 to pH <2; 4 ˚C	500 mL plastic	10d	180d	
Water	Hexavalent chromium	EPA Method 7199	4 ˚C	500 mL plastic	10d	24h	7d
Water	Alkalinity	SM 2320B	4 °C	500 mL plastic	10d	14d	
Water	Ammonia	SM 4500-NH3 D	H_2SO_4 to pH <2; 4 ˚C	500 mL plastic	10d	28d	
Water	Inorganic ions(5)	EPA Method 300.0	H_2SO_4 to pH <2; 4 ˚C	500 mL plastic	10d	28d or 48 h(6)	
Water	Chlorate	EPA Method 300.1	H_2SO_4 to pH <2; 4 ˚C	500 mL plastic	10d	28d	
Water	Cyanide	EPA Method 9014B	NaOH to pH >12; 4 ˚C	1 x 1L plastic	10d	14d	
Water	Phosphorus	EPA Method 365.3	H_2SO_4 to pH <2; 4 ˚C	500 mL plastic	10d	28d	
Water	Perchlorate	Sterile Filtered(7) EPA Method 314.0	4 °C	500 mL plastic	10d	28d	
Water	Specific Conductance	EPA Method 120.1 / SM 2510B	4 °C	500 mL plastic	10d	28d	
Water	Total Dissolved Solids (TDS)	SM 2540C	4 °C	500 mL plastic	10d	7d	
Water	Total Suspended Solids (TSS)	SM 2540D	4 °C	1 x 1 L plastic	10d	7d	

TABLE 7. SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

MATRIX	ANALYTES	ANALYTICAL METHOD	PRESERVATION	CONTAINER(1)(2)	TAT	HOLD TIME(3) Prior to Extraction	HOLD TIME(3) After Extraction
Water	Surfactants	SM 5540C	4 °C	1 x 1 L plastic	10d	48 h	
Water	Radium 226	EPA Method 903.0	None	2 x 1 L plastic	22d	180d	
Water	Radium 228	EPA Method 904.0	None	2 x 1 L plastic	22d	180d	
Water	Thorium 228, 230, 232	DOE EML HASL 300 (alpha spectroscopy)	None	500 mL plastic	22d	180d	
Water	Thorium 234	EPA 901.1 (gamma spectroscopy)	None	500 mL plastic	22d	180d	
Water	Total Uranium	ASTM D5174 / KPA	None	500 mL plastic	22d	180d	
Water	Uranium 234, 235, 238	DOE EML HASL 300 modified (alpha spectroscopy)	None	500 mL plastic	22d	180d	
Soil	Volatile Organic Compounds (VOCs)	EPA Method 8260B	4 °C	3 X 40 mL VOA vials 2 with DI water and 1 with MeOH	10d	Unpreserved VOA vials must be frozen within 48h of collection, 14d from field preservation to analysis.	
Soil	Semivolatile Organic Compounds (SVOCs)	EPA Method 8270C	4 °C	1 X 8 oz glass jar with Teflon-lined cap	10d	14d	40d
Soil	Volatile Organic Acids	Organic Acid Analysis	4 °C	1 X 8 oz glass jar with Teflon-lined cap	10d	28d	
Soil	Organochlorine Pesticides	EPA Method 8081A	4 °C	1 X 8 oz glass jar with Teflon-lined cap	10d	14d	40d
Soil	Organophosphorus Pesticides	EPA Method 8141A	4 °C	1 X 8 oz glass jar with Teflon-lined cap	10d	14d	40d
Soil	PCBs as Aroclors	EPA Method 8082	4 °C	1 X 8 oz glass jar with Teflon-lined cap	10d	14d	40d
Soil	PCBs as Congeners	EPA Method 1668A	4 °C, from field, lab storage < -10 °C	1 X 8 oz glass jar with Teflon-lined cap	20d	1y	45d

TABLE 7. SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

MATRIX	ANALYTES	ANALYTICAL METHOD	PRESERVATION	CONTAINER(1)(2)	TAT	HOLD TIME(3) Prior to Extraction	HOLD TIME(3) After Extraction
Soil	Dioxins/Furans	EPA Method 8290	4 °C	1 X 8 oz glass jar with Teflon-lined cap	15d	30d	45d
Soil	Gasoline Range Organics (GROs)	EPA Method 8015B	4 °C	3 X 40 mL VOA vials 2 with DI water and 1 with MeOH	10d	Unpreserved VOA vials must be frozen within 48h of collection, 14d from field preservation to analysis.	
Soil	Diesel/Oil Range Organics (DROs/OROs)	EPA Method 8015B	4 °C	1 X 8 oz glass jar with Teflon-lined cap	10d	14d	40d
Soil	Metals	EPA Method 200.7 / 6010B	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	180d	
Soil	Metals	EPA Method 200.8 / 6020	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	180d	
Soil	Rare Earth Metals(4)	EPA Method 6020A	4 °C	1 X 2 oz glass jar with Teflon-lined cap	11d	180d	
Soil	Mercury	EPA Method 7471A	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	28d	
Soil	Hexavalent chromium	EPA Method 7199	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	30d to digestion; 7d from digestion to analysis	
Soil	Alkalinity	SM 2320B	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	
soil	Ammonia	SM 4500-NH3 D	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	

TABLE 7. SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

MATRIX	ANALYTES	ANALYTICAL METHOD	PRESERVATION	CONTAINER[(1)(2)]	TAT	HOLD TIME[(3)] Prior to Extraction	HOLD TIME[(3)] After Extraction
Soil	Inorganic Ions[(5)]	EPA Method 300.0	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	
Soil	Chlorate	EPA Method 300.1	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	
Soil	Cyancide	EPA Method 9014B	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	14d	
Soil	Formaldehyde	EPA Method 8315A	4 °C	1 X 8 oz glass jar with Teflon-lined cap	10d	14d	3d
Soil	Perchlorate	EPA Method 314.0	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	28d	
Soil	pH	EPA Method 9045C	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	Immediate	
Soil	Specific Conductance	EPA Method 120.1 / SM 2510B	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	
Soil	Total Dissolved Solids (TDS)	SM 2540C	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	
Soil	Total Suspended Solids (TSS)	SM 2540D	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	

TABLE 7. SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

MATRIX	ANALYTES	ANALYTICAL METHOD	PRESERVATION	CONTAINER(1)(2)	TAT	HOLD TIME(3)	
						Prior to Extraction	After Extraction
Soil	Surfactants	SM 5540C	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	None for soil. Use water holding time for leachates.	
Soil	Total Organic Carbon	EPA Method 9060A / SM 5310B	4 °C	1 X 4 oz glass jar with Teflon-lined cap	10d	28d	
Soil	Radium 226	DOE EML HASL 300 (gamma spectorscopy)	None	1 X 500 mL plastic	22d	180d	
Soil	Radium 228	DOE EML HASL 300 (gamma spectorscopy)	None	1 X 500 mL plastic	22d	180d	
Soil	Thorium 228, 230, 232	DOE EML HASL 300 modified (alpha spectroscopy)	None	1 X 50 mL plastic	22d	180d	
Soil	Thorium 234	DOE EML HASL 300 (gamma spectorscopy)	None	1 X 500 mL plastic	22d	180d	
Soil	Total Uranium	ASTM D5174 / KPA	None	1 X 50 mL plastic	22d	180d	
Soil	Uranium 234, 235, 238	DOE EML HASL 300 modified (alpha spectroscopy)	None	1 X 50 mL plastic	22d	180d	
Soil	Asbestos	EPA Method 600/R-93/116 modified per Berman & Kolk (2000)	None	1 X 250 mL glass with Teflon-lined cap	30d	None established for soil.	
Soil Gas	Volatile Organic Compounds (VOCs)	EPA Method TO-15, EPA Method SW8260B	None	SUMMA canister	5d	30d	
Hydrogen Sroud	Volatile Organic Compounds (VOCs)	EPA Method TO-15, EPA Method SW8260B	None	Tedlar bag	5d	6h	

Notes:

ASTM = American Society for Testing and Materials
DOE = Department of Energy
HASL = Health and Safety Laboratory
EML = Environmental Measurements Laboratory
EPA = United States Environmental Protection Agency
KPA = Kinetic Phosphorescense Analyzer
SIM = Single Ion Monitoring
SM = Standard Method
TCLP = Toxicity Characteristic Leaching Procedure

HCL = Hydrochloric Acid
H_2SO_4 = Sulfuric Acid
HNO_3 = Nitric Acid
NaOH = Sodium Hydroxide

d = day(s)
h = hours
mL = milliliters
L = liter
oz = ounces
y = year

(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) Holding time begins from date of sample collection. Leachate holding times must conform to water holding time or the requirements of EPA Method 1312.
(4) Niobium, palladium, and/or sulfur
(5) Fluoride, chloride, bromide, sulfate, ortho-phosphate as PO_4, nitrite as NO_2, and nitrate as NO_3.
(6) 28 days for fluoride, chloride, bromide, and sulfate; 48 hours for nitrate, nitrate, and orthophosphate
(7) Water samples analyzed for perchlorate must be field filtered using sterile 20-millilter (mL) syringes and sterile surfactant free cellulose acetate 0.2 micrometer (µm) filters into sterile sample containers (125-mL sterile high density polyethylene bottles). Additional perchlorate sampling requirements are detailed in Nevada Divison of Environmental Protection (NDEP) guidance documents.
Immediate means within 15 minutes from sampling or field test

TABLE 8. CALIBRATION AND MAINTENANCE OF FIELD EQUIPMENT
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

INSTRUMENT	TASK	FREQUENCY
Organic Vapor Meter OVM[1]	(a) Inspect and calibrate (b) Charge batteries	(a) Daily (b) Each night prior to operation
Particulate monitor[2]	(a) Inspect and calibrate (b) Charge batteries	(a) Daily (b) Each night prior to operation
Asbestos monitor[3]	(a) Inspect and calibrate (b) Charge batteries	(a) Daily (b) Each night prior to operation
Conductivity, Dissolved Oxygen (DO), Oxygen Reduction Potential (ORP), pH, and Temperature Meter[4]	(a) Inspect and calibrate (b) Test batteries	(a) Daily (b) Each night prior to operation
Turbidity Meter[5]	(a) Inspect and calibrate (b) Test batteries	(a) Daily (b) Each night prior to operation
Alkalinity Test Kit[6]	(a) Inspect kit integrity	(a) Daily prior to testing
Ferrous Iron Test Kit[7]	(a) Inspect kit integrity	(a) Daily prior to testing
Sulfide Test Kit[8]	(a) Inspect kit integrity	(a) Daily prior to testing
Water Level Indicator[9]	(a) Inspect (b) Test batteries (c) Calibrate	(a) Daily (b) Each night prior to operation (c) Annually with steel tape
Low flow adjustable-rate sampling pump[10]	(a) Change bladder (b) Change tubing[11]	(a) Each sample location (b) Each sample location
Low flow adjustable-rate sampling pump	(a) Inspect (b) Calibrate	(a) Individually prior to operation (b) Factory calibrated prior to shipment to site
Pressure Transducers[12]	(a) Inspect data log (b) Check batteries and o-rings (c) Perform depth and drift tests (d) Calibrate	(a) Daily (b) Prior to installation (c) Prior to installation (d) Factory calibrated prior to shipment to site

Notes:

(1) MiniRAE 2000 Photoionization Detector (PID) with 10.6 eV lamp or similar

(2) DataRAM pDR-1000AN or similar

(3) Gilian BDX II Personal Abatement Air Sampler or similar

(4) YSI 556 MPS or similar

(5) HACH 2100P Turbidity Meter or similar

(6) HACH Digital Titrator or similar

(7) HACH, CHEMetrics, or similar. Method based on ASTM D 1068-77.

(8) HACH, CHEMetrics, or similar. Method based on USEPA Method 376.2 and Apha Method 4500-S^2-D.

(9) Solinst Water Level Indicator or similar having gradations marked at 0.01-foot intervals.

(10) QED Sample Pro or similar

(11) Teflon® or Teflon®-lined

(12) In Situ Level Troll 500 vented water level/temperature monitor or similar.

TABLE 9. ANALYTICAL LABORATORY CALIBRATION FREQUENCIES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

		QUALITY CONTROL CHECK[1]	
LABORATORY ANALYSIS	**ANALYTICAL METHOD**	**Initial Calibration Type/Frequency**	**Continuing Calibration Type/Frequency**
Volatile Organic Compounds (VOCs) by EPA 8260B	Gas Chromatography/ Mass Spectroscopy	Minimum five points on an as needed basis with daily verification before sample analysis.	Standard analyzed at the beginning of every sequence.
Volatile Organic Compounds (VOCs) by EPA SW8260B	Gas Chromatography/ Mass Spectroscopy	Series of calibration solutions used prior to analysis	Standard analyzed at least once every 20 samples.
Semivolatile Organic Compounds (SVOCs) by EPA Method 8270C and 625	Gas Chromatography/ Mass Spectroscopy	Minimum five points on an as needed basis with daily verification before sample analysis.	Standard analyzed at beginning of the sequence.
Organochlorine Pesticides by EPA Method 8081A	Gas Chromatography	Minimum five point calibration daily prior to analysis.	Standard analyzed prior to each 12-hour shift, at least once every 20 samples, and at the end of the sequence.
PCBs as Aroclors by EPA Method 8082	Gas Chromatography	Seven point calibration on an as needed basis with daily verification before sample analysis.	Standard analyzed prior to each 12-hour shift, at least once every 20 samples, and at the end of the sequence.
Gasoline Range Organics by EPA Method 8015B	Gas Chromatography	Minimum five point calibration daily prior to analysis.	Standard analyzed after every 10 sample-injections or 12 hours, which ever is sooner and at the end of the sequence.
Diesel Range Organics by EPA Method 8015B	Gas Chromatography	Minimum five point calibration daily prior to analysis.	Standard analyzed prior to each 12-hour shift, at least once every 20 samples, and at the end of the sequence.
Metals by EPA Method 6010B	Inductively Coupled Plasma Atomic Emission Spectroscopy	Minimum two point and a blank calibration daily prior to analysis.	Standard analyzed at a minimum after every 10 samples and end of the sequence.
Metals by EPA Method 6020	Inductively Coupled Plasma/ Mass Spectroscopy	Four point (three standard + blank) calibration daily prior to analysis.	Standard analyzed after every 10 samples.
Rare Earth Metals by EPA Method 6020A	Inductively Coupled Plasma/ Mass Spectroscopy	Four point (three standard + blank) calibration daily prior to analysis.	Standard analyzed after every 10 samples.
PCBs as Congeners by EPA Method 1668A	High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry	Mimium five point calibration daily prior to analysis.	Standard analyzed at the beginning of and after each 12-hour shift.
Organophosphorus Pesticides by EPA Method 8141A	High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry	Mimium five point calibration daily prior to analysis.	Standard analyzed at the beginning of and after each 12-hour shift.
Dioxins/Furans by EPA Method 8290	High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry	Five point calibration daily prior to analysis.	Standard analyzed at the beginning of and after each 12-hour shift.
Mercury by EPA Method 7471A	Cold-Vapor Atomic Absorption Spectroscopy	Minimum three points plus a blank daily prior to analysis	Standard analyzed after every 10 samples and end of the sequence.

TABLE 9. ANALYTICAL LABORATORY CALIBRATION FREQUENCIES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

		QUALITY CONTROL CHECK[1]	
LABORATORY ANALYSIS	**ANALYTICAL METHOD**	**Initial Calibration Type/Frequency**	**Continuing Calibration Type/Frequency**
Inorganic Anions by EPA Method 300.0 and 300.1	Ion Chromatography	Minimum three points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed after every 10 samples and end of sequence.
Hexavalent Chromium by EPA Method 7199	Ion Chromatography	Minimum three points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed at least once every 10 samples and end of the sequence.
Perchlorate by EPA Method 314.0	Ion Chromatography	Minimum five points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed after every 10 samples and end of the sequence.
Surfactantsby SM 5540C	Spectroscopy	Minimum five points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed at least once every 10 samples and end of the sequence.
Phosphorus by EPA Mathod 365.3	Spectroscopy	Minimum three points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed at least once every 10 samples and end of the sequence.
Cyanide by EPA Method 9014B	Spectroscopy	Minimum three points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed at least once every 10 samples and end of the sequence.
Organic Acids	High-Performance Liquid Chromatography-Ultraviolet Detection	Minimum five point calibration daily prior to analysis.	Standard analyzed at the beginning of and after each 12-hour shift.
Formaldehyde by EPA Method 8315A	High-Performance Liquid Chromatography-Ultraviolet Detection	Minimum five point calibration daily prior to analysis.	Standard analyzed at least once every 10 samples, not to exceed 12 hours, and end of the sequence.
Specific Conductance by EPA Method 120.1	Conductivity Bridge with platium electrode	Two point calibration daily prior to analysis	Standard analyzed after every 10 samples and end of the sequence.
Ammonia by SM 4500-NH_3	Determined Potentiometrically with an Ion Selective Ammonia Electrode	Minimum five points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed at least once every 10 samples and end of the sequence.
Total Organic Carbon	Non-Dispersive Infrared Analyser	Minimum three points plus a blank on an as needed basis with daily verification before sample analysis.	Standard analyzed daily.
Thorium 234 by EPA Method 901.1	Gamma Spectroscopy	Annual calibration againest standards with daily verification before sample analysis.	Source standard analyzed daily.
Radium 226 by EPA Method 903.0	Gamma Spectroscopy	Annual calibration againest standards with daily verification before sample analysis.	Source standard analyzed daily.

TABLE 9. ANALYTICAL LABORATORY CALIBRATION FREQUENCIES
QUALITY ASSURANCE PROJECT PLAN
Nevada Environmental Response Trust; Henderson, Nevada

		QUALITY CONTROL CHECK[1]	
LABORATORY ANALYSIS	**ANALYTICAL METHOD**	**Initial Calibration Type/Frequency**	**Continuing Calibration Type/Frequency**
Radium 228 by EPA Method 904.0	Gamma Spectroscopy	Annual calibration againest standards with daily verification before sample analysis.	Source standard analyzed daily.
Thorium 234 by HASL 300	Gamma Spectroscopy	Annual calibration againest standards with daily verification before sample analysis.	Source standard analyzed daily.
Thorium 228, 230, 232 by Method HASL 300 modified	Alpha Spectroscopy	Monthly calibration againest standards with daily verification before sample analysis.	Source standard analyzed daily.
Uranium 234, 235, 238 by Method HASL 300 modified	Alpha Spectroscopy	Monthly calibration againest standards with daily verification before sample analysis.	Source standard analyzed daily.
Total Uranium by ASTM D5174 / KPA	Kinetic Phosphorescense Analyzer	Mimium five point calibration daily prior to analysis.	Standard analyzed at least once every 10 samples and end of the sequence.

Notes:

ASTM = American Society for Testing and Materials

EPA = United States Environmental Protection Agency

HASL = Health and Safety Laboratory

KPA = Kinetic Phosphorescense Analyzer

SM = Standard Method

(1) These Quality Control checks are to be considered the minimum frequency and scope of checks and calibrations to be performed. Laboratories may have more stringent requirements as part of their Standard Operating Procedures.

Appendix A

Laboratory Quality Assurance Manuals (QAMs)

[provided on CD only]

Appendix B

Laboratory Standard Operating Procedures (Lab SOPs)

[provided on CD only]

Appendix C

ENVIRON Laboratory Electronic Data Deliverable Format Specification, EQuIS Edition

[provided on CD only]