BRC QUALITY ASSURANCE PROJECT PLAN

BMI COMMON AREAS
CLARK COUNTY, NEVADA

Prepared for:

Basic Remediation Company (BRC)
875 West Warm Springs Road
Henderson, Nevada 89015

Prepared by:

ERM-West, Inc.
2525 Natomas Park Drive, Suite 350
Sacramento, California 95833

MWH
3321 Power Inn Road, Suite 300
Sacramento, California 95826

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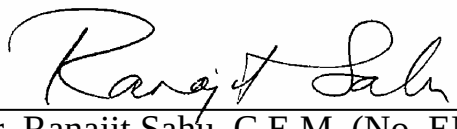
A PROJECT MANAGEMENT

A1. TITLE AND APPROVAL SHEET

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. I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.



February 22, 2008

Dr. Ranajit Sahu, C.E.M. (No. EM-1699, Exp. 10/07/2009) Date
BRC Project Manager

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A2.4 ACRONYMS AND ABBREVIATIONS

Alpha	Alpha Analytical, Inc.
AOC3	Settlement Agreement and Administrative Order on Consent: BMI Common Areas, Phase 3
AWQC	ambient water quality criteria
ASTM	American Society of Testing and Materials
BEC	Basic Environmental Company
BMI	Basic Management, Incorporated
BRC	Basic Remediation Company
C.E.M.	Certified Environmental Manager
CLP	Contract Laboratory Program
CAMU	Corrective Action Management Unit
DBSA	D.B. Stephens and Associates
DQI	data quality indicator
DQO	data quality objective
EDD	electronic data deliverable
EMSL	EMSL Analytical, Inc.
ESL	ecological screening level
FSP	Field Sampling Plan
FSSOP	Field Sampling and Standard Operating Procedures
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSP	Health and Safety Plan
HISSC	Henderson Industrial Site Steering Committee
Kerr-McGee	Kerr McGee Chemical, LLC
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MSD	matrix spike duplicate
MCLs	maximum contaminant levels

A2.4 ACRONYMS AND ABBREVIATIONS

MDL	method detection limit
MRL	method reporting level
NIST	National Institute of Standards and Technology
NDEP	Nevada Division of Environmental Protection
NFA	No Further Action
%R	percent recovery
PE	performance evaluation
Pioneer	Pioneer Chlor Alkali Company, Inc.
PARCC	precision, accuracy, representativeness, comparability, and completeness
PRG	preliminary remediation goal
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RIB	Rapid Infiltration Basin
RME	reasonable maximum exposure
RPD	relative percent difference
RBSL	risk-based screening level
SAP	Sampling and Analysis Plan
SRC	site-related chemical
SSL	soil screening level
SOP	Standard Operating Procedure
SWA	Southwest Analytical
TestAmerica	TestAmerica Analytical Testing Corp.
TIMET	Titanium Metals Corporation

A3. DISTRIBUTION LIST

Most of the data intense tasks will be accomplished by Basic Remediation Company (BRC) or Basic Environmental Company (BEC), and their consultants and subcontractors with oversight, review, and approval by the State of Nevada Department of Conservation and Natural Resources, Division of Environmental Protection (NDEP). Table 1 presents a general distribution list for the project. Each document prepared will include this distribution list with an indication of how each document will be distributed.

A4. PROJECT ORGANIZATION

A project organization chart is provided on Figure 1. The project organization defines the lines of communication and identifies key personnel assigned to various project activities. The respective work plan will provide a description of the organizational structure and specific responsibilities of the individual positions for the respective project activities. The individuals participating in the project and their specific roles and responsibilities are discussed below.

A4.1 Regulatory Agency

NDEP is the oversight agency for Basic Management, Incorporated (BMI) Common Areas (Site) activities. NDEP will provide regulatory oversight for all aspects of investigative and remedial activities at the Site and offer direction on NDEP policy and environmental objectives. All field activities and reports will be supervised by a State of Nevada Certified Environmental Manager (C.E.M.). This revision of the Quality Assurance Project Plan (QAPP), Revision 3, incorporates comments received from NDEP, dated December 13, 2005, on Revision 0 of the QAPP, dated October 2005, and comments received from NDEP, dated March 30, 2006, on Revision 1 of the QAPP, dated March 2006. This revision also incorporated changes based on the NDEP-approved Standard Operating Procedure (SOP) 40 (Data Review/Validation), which is found in the BRC *Field Sampling and Standard Operating Procedures* (FSSOP) manual (BRC, ERM and MWH 2007). The NDEP comments and BRC's response to these comments are included in Appendix A.

A4.2 Basic Remediation Company/Basic Environmental Company

Dr. Ranajit Sahu, C.E.M. is the Director of Environmental Services for BRC and BEC. Dr. Sahu will serve as Project Manager for BRC/BEC. Dr. Sahu will be responsible for directional decisions, as well as for budget control, and for work conducted on the project on behalf of

BRC/BEC. In addition, Dr. Sahu will serve as the quality assurance (QA) Manager for the project.

A4.3 Investigation Consultants

The investigation contractor has responsibility for assigned phases of investigation and reporting. Together, the management team (Program Director, Project Manager, Task Managers, Technical Leads, and Field Managers) will be responsible for the technical planning and implementation of the prescribed work. Other responsibilities include strategy development, budget control, project schedule, and document review. The QA staff has responsibility for effective planning, verification, and management of QA activities associated with the assigned project.

A4.3.1 MWH

As directed by BRC, MWH will assign technical staff to provide expertise and oversight in their respective fields of knowledge. Mr. Tony Mikacich is the MWH Project Manager. Mr. Mikacich will provide direction to MWH technical staff for programs executed by MWH.

A4.3.2 ERM

As directed by BRC, ERM will assign technical staff to provide expertise and oversight in their respective fields of knowledge. Mr. Mark Jones is the ERM Project Manager. Mr. Jones will provide direction to technical staff for programs implemented by ERM. Ms. Jill Quillin, C.E.M., also provides technical support and direction for the project.

A4.3.3 D.B. Stephens and Associates

As directed by BRC, D.B. Stephens and Associates (DBSA) will assign technical staff to provide expertise and oversight in their respective fields of knowledge. Stephen Cullen, PhD, C.E.M., is the DBSA Project Manager. Dr. Cullen will provide direction to technical staff for programs implemented by DBSA.

A4.4 Laboratories

It is anticipated that the primary off-site laboratories will be TestAmerica Analytical Testing Corp. (TestAmerica) in St. Louis, Missouri; TestAmerica in Richland, Washington (for radionuclide analyses); Alpha Analytical, Inc. (Alpha) in Sparks, Nevada; EMSL Analytical, Inc. (EMSL) in Westmont, New Jersey; and Southwest Analytical, Inc. (SWA) in Las Vegas, Nevada. TestAmerica, Alpha, EMSL and SWA will perform analytical testing for samples

collected during various field investigations. The respective laboratory's project manager will report to the Field Manager, on all aspects of the sample analysis. In addition, the QA Manager will be advised of any matters related to data quality during the course of the investigation. The laboratory will conform to the QA and quality control (QC) procedures, outlined in the respective laboratory Quality Assurance Plans (maintained by the laboratory) and laboratory SOPs. Copies of laboratory quality manuals are included in Appendix B and maintained in the project files.

A5. PROBLEM DEFINITION/BACKGROUND

This QAPP has been prepared by BRC to address QA and QC policies associated with the collection of environmental data for characterization activities at the Site. All sampling and analysis activities will be conducted under the oversight of NDEP, pursuant to the Phase II Consent Agreement for the BMI Common Areas (Consent Agreement) executed between the Henderson Industrial Site Steering Committee (HISSC) and NDEP on February 23, 1996. This QAPP has been designed to support the data collection activities associated with the various sampling and analysis tasks pertaining to any characterization activities conducted at the Site.

This QAPP is an integral part of the project repository for the BMI Common Areas and is to be incorporated by reference as the general guidance document for implementing QA/QC procedures for all sampling and analysis programs conducted at the Site. U.S. Environmental Protection Agency (USEPA) policy requires a QAPP for all environmental data collection projects mandated or supported by the USEPA through regulations or other formalized means (USEPA 2002a), such as site characterization and risk assessment. The purpose of this QAPP is to identify the methods to be employed to establish technical accuracy, precision, and validity of data that are generated for decision making purposes.

The project Site is located in Clark County, Nevada, approximately 13 miles southeast of Las Vegas, Nevada. The Site is separated into two main properties, divided by Boulder Highway (Figure 2). West of Boulder Highway is the Corrective Action Management Unit (CAMU) Area (hereinafter referred to as the 'CAMU') as well as other properties owned by BEC as shown on Figure 2. East of Boulder Highway is the BMI Upper and Lower Ponds Area (hereinafter referred to as the 'Eastside').

BRC's overall project goal for the Eastside is that post-certification conditions at the Site be such that residual chemical concentrations in Site soils are either representative of background

conditions, or do not pose an unacceptable risk to human health and the environment under all anticipated future land uses, considering all relevant pathways and using the best possible risk assessment methodology, per USEPA guidance. BRC plans to request a finding of No Further Action (NFA) from NDEP to document that this goal has been attained. Once granted an NFA, BRC plans to restore the property to a higher and beneficial use via implementation of an organized, multi-phased development program. Redevelopment of the Eastside is proposed; however, development plans have not been finalized at this time.

Contaminated soils excavated from the Eastside will be transported to the CAMU for containment. A portion of the CAMU will be two below ground areas that will be excavated, and another portion that will be above ground. The CAMU will be fully lined and capped. The CAMU will permanently inter these off-site contaminated soils and will also cap the slit trenches, thereby providing point source control of possible leaching contaminants. The CAMU will have appropriate institutional controls and all requisite monitoring devices to ensure the integrity of its contents.

A6. PROJECT DESCRIPTION

The following is a brief summary of the CAMU and Eastside properties. A comprehensive narrative of historical Site ownership and operations for the Eastside is found in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007). A comprehensive narrative of historical Site ownership and operations at the CAMU is found in the draft *CAMU Area Conceptual Site Model* (DBS&A and BRC 2007).

A6.1 Eastside

The Eastside consists primarily of former wastewater effluent ponds (now dry), into which various wastewaters from the Basic Magnesium Complex were discharged from the early 1940s through 1976, and the system of conveyance ditches that were used to transport wastewaters to the ponds. The Eastside also includes inactive, lined ponds used by Titanium Metals Corporation (TIMET) in the southwestern portion of the Upper Ponds that were constructed in the same location as the former wastewater effluent ponds. In addition to the inactive and former effluent ponds and conveyance ditch segments, the Eastside also includes adjoining lands northeast of Boulder Highway, northwest of Lake Mead Drive, and south of the Las Vegas Wash. The Eastside, as defined for the purpose of this QAPP, encompasses an area of approximately 2,330 acres and includes the following land-based areas:

- The portions of the BMI Common Areas addressed by the 1996 Consent Agreement between NDEP and the HISSC that are east of Boulder Highway, excluding Parcels 4A and 4B;
- Parcel 9 South, a 9.5-acre parcel west of Boulder Highway that is included in the 1996 Consent Agreement (it should be noted that Parcel 9 North has been issued an NFA by NDEP, and is not included in the Site definition); and
- The Southern Rapid Infiltration Basins (RIBs) and the TIMET Ponds area, which are not included in the 1996 Consent Agreement.

In addition, groundwater flowing beneath the Eastside, as well as Exclusion Areas 4A and 4B, is also addressed by this QAPP. Figure 2 illustrates the boundaries of the Eastside property.

A6.2 Corrective Action Management Unit (CAMU)

The CAMU is located within the boundaries of property owned and operated by BEC, in an area formerly designated as the Clark County Industrial Plant Area, and is bordered on all sides by former and present industrial production facilities of the BMI Industrial Complex. More specifically, the CAMU is bounded on the south by property owned by Pioneer. The eastern boundary is the border between property owned by Kerr-McGee and property owned by BEC. The northern boundary is defined by the northern limit of the toe of the closed BMI Landfill. The western boundary is defined by a northwest trending line that runs along the western margin of the proposed aggregate borrow pit area. The existing BMI Landfill, the western-most trade effluent pond and portions of the adjacent second trade-effluent pond are within the boundary of the CAMU. Figure 2 illustrates the boundaries of the CAMU and remainder of the property west of Boulder Highway.

The CAMU will contain contaminated soils excavated from the Eastside, as more fully described in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007). Plans for the CAMU being proposed at the Site are currently in the engineering design phase and have been submitted to NDEP for its review in the *Remedial Action Plan* (BRC 2007).

A6.3 Other Areas

Other areas, as discussed in Appendix E, Section 3.1.24 of the Settlement Agreement and Administrative Order on Consent: BMI Common Areas, Phase 3 (AOC3), outside the boundaries of both the Eastside and the CAMU as discussed above include the following:

- BMI Siphon; and
- Portions of the western and northwestern ditches north of the CAMU boundary and south of the Western Hook portion of the Eastside.

These areas are shown on Figure 2.

A7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT OF DATA

In preparation for future site development, data needs were evaluated for assessing chemical distributions in soil, sediment, groundwater, and surface water, for determining human health and ecological risk, and to develop remedial alternatives for the site. The seven-step data quality objectives (DQO) process (USEPA 2006) will be used to identify the adequacy of existing data and the need for additional data, to develop the overall approach to each study element, and ultimately to develop the various Sampling and Analysis Plans (SAPs) or Field Sampling Plans (FSPs) for the Site. The DQO processes for the various aspects of the site characterization are provided in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007).

The need for low-level reporting limits has been identified for the project. Preliminary risk-based screening levels (RBSLs) and ecological screening levels (ESLs) have been developed to identify analytical sensitivity levels that will be sufficient to determine risks to ecological and human health. The methodologies for developing these screening levels are presented in the human health and ecological risk assessment sections of the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007). Although preliminary RBSLs and ESLs can be met for many analytes, modifications to optimize laboratory method reporting levels (MRLs) may be needed to meet ecological and human health protective levels. Preliminary RBSLs and ESLs are provided in Table 2. In addition to these RBSLs and ESLs, regulatory established screening levels and standards (USEPA Region 9 preliminary remediation goals [PRGs], USEPA soil screening levels [SSLs], maximum contaminant levels [MCLs], and chronic freshwater ambient water quality criteria [AWQC]) are also presented in Table 2. Analytical sensitivity is discussed further in the following sections.

The following are general project DQOs to support the qualitative and quantitative design of data collection efforts and to ensure that cleanup goals that protect human health and the environment are achieved at the Site. Specific DQOs will be provided in the various investigation and closure documents prepared for the Site.

- What are the soils and groundwater background concentrations for metals, radionuclides, and other anthropogenic contaminants (contaminants that are generally present regionally due to non-site related human activities)?
- Are human health and ecological risks adversely impacted in off-site areas due to transport of contaminants by wind and surface water?
- Have sediments at the bottom of the Las Vegas Wash been impacted by Site activities such that acceptable human health and ecological risks have been exceeded?
- Are human health risks for on-site soils for future land uses (residential, commercial, recreational, and construction) acceptable?
- Are human health and ecological risks associated with groundwater in the Upper Zone acceptable?
- Does groundwater in the Middle and Deep Zones adversely impact human health and ecological risks?
- Do health risks associated with the Las Vegas Wash exceed acceptable standards for human health and ecological receptors at the point of reasonable maximum exposure (RME) as a result of contaminants migrating from the Site?
- Will groundwater rise and discharge at the ground surface on-site and down gradient after development and if so, will it present a health risk to future human and ecological receptors?
- Will residual concentrations of contaminants in the vadose zone leach to groundwater after development and present a risk to human and ecological receptors?
- Do residual concentrations of Site-related contaminants pose unacceptable risks to exposed ecological receptors of concern in on-Site and off-Site media (soil, groundwater, surface water, air)?
- Are hot spots present that are of immediate concern to human health or ecological habitats?
- Are contamination and health risks associated with soils in the ditches higher than in the ponds?

- Will future residents that move in after portions of the Site are remediated be adversely impacted by other portions of the Site that are not remediated?

The quality of analytical data can be assessed through the evaluation of data quality indicators (DQIs). DQIs serve as the basis for assessing the precision, accuracy, representativeness, comparability, and completeness (PARCC) of a particular data set. DQIs are both quantitative and qualitative measurements of the analytical data, as evaluated through the process of data review and validation.

A7.1 Precision

Precision measures the reproducibility of repetitive measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the sample process under similar conditions.

Analytical precision is a measurement of the variability associated with duplicate or replicate analyses of the same sample in the laboratory, and is determined by analysis of laboratory control samples (LCS), such as LCS duplicates (LCSD), matrix spike duplicates (MSD), or sample duplicates. If the recoveries of analytes in the specified control samples are within control limits set forth by the laboratory, then precision is considered to be acceptable.

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

The precision of duplicate results is assessed by calculating the relative percent difference (RPD) between the duplicate measurements. If the RPD for laboratory-derived duplicate samples exceeds 20 percent for inorganic analytes, data will be qualified as described in the applicable validation procedure (USEPA 2004a). There are no criteria for organic laboratory duplicate precision because typically laboratories do not analyze laboratory duplicates for organic analyses.

According to the USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA 2004a), data are not qualified on the basis of field duplicate imprecision. However, a control criterion for an RPD for field duplicate samples will be 50 percent for this project. Qualification of sample data is to be as described in SOP-40 (BRC,

ERM and MWH 2007), similar to the qualification of samples based on laboratory duplicates. The RPD is calculated as follows:

$$RPD\,(\%) = \left[\frac{S - D}{\left(\frac{S + D}{2} \right)} \right] \times 100$$

where S the concentration of the original sample, and D is the concentration of the duplicate sample.

A7.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random (variability due to imprecision) and systematic error. It reflects the total error associated with a measurement. A measurement is accurate when the value reported does not significantly differ from the true value or known concentration of the spike or standard.

Accuracy of laboratory analyses will be assessed by LCS, surrogate standards (for organic analytical methods), matrix spikes, and initial and continuing calibration of instruments. Laboratory accuracy is expressed as the percent recovery (%R). Statistically derived laboratory accuracy limits will be included with each laboratory report. If the %R is determined to be outside of acceptance criteria, data will be qualified according to SOP-40 (BRC, ERM and MWH 2007) and the direction of the bias noted in the data validation memoranda. The calculation of %R is provided below:

$$\%R = 100 \times \frac{X_s - X}{T}$$

where X_s is the measured value of the spiked sample, X is the measured value of the unspiked sample, and T is the true value of the spike solution added.

Field accuracy will be assessed through analysis of field equipment blanks and trip blanks. Analysis of blanks will monitor errors associated with the sampling process, field conditions, sample preservation, and sample handling. The DQO for field equipment and trip blanks is that all values are less than the reporting limit for each target constituent. If contamination is identified in the field equipment or trip blanks, data will be qualified in the associated samples as described in the guidelines used for validation (USEPA 1999 and 2004a) and as described in

SOP-40 (BRC, ERM and MWH 2007). Contamination of the samples can occur as a result of field or laboratory operations, and detections due to such contamination are not representative of actual Site conditions.

A7.3 Representativeness

Representativeness is the degree to which data accurately and precisely represent characteristics of a population, process condition, or environmental condition of the media sampled. Representativeness of data collection is addressed by using appropriate and consistently established sampling and analytical methods. The SAPs/FSPs will address representativeness by specifying sufficient and proper numbers and locations of samples; incorporating appropriate sampling methodologies; specifying proper sample collection techniques and decontamination procedures; selecting appropriate laboratory methods to prepare and analyze samples; and establishing proper field and laboratory QA/QC procedures, as outlined in this QAPP. The design of any data collection must also consider the representativeness of site conditions in terms of lithologic, physical, and chemical parameters.

A7.4 Completeness

Completeness is a measure of the relative number of usable data points that meet all the acceptance criteria for accuracy, precision, and any other criterion required by the specific analytical methods used. Based on USEPA guidance, completeness goals are expressed as a percentage (USEPA 2002b).

The number of valid results divided by the number of possible results, expressed as a percentage, determines the completeness of the data set. The objective for completeness is at minimum 90 percent of the total data set. Discretionary re-sampling may be performed at the direction of BRC and NDEP, should a lack of data for a given chemical or sample location be critical to the decision making process.

The formula for calculation of completeness is presented as follows:

$$\%Completeness = 100 \times \frac{Number\ of\ Valid\ Results}{Number\ of\ Expected\ Results}$$

Qualitatively, the completeness goal provides the necessary information to support project decisions. Completeness is achieved when both the quantitative and qualitative objectives are met for this parameter (*i.e.*, project decisions can be made using the data set).

A7.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability is a qualitative, not quantitative, measurement. Comparability is assessed by reviewing results, or procedures, for data that do not agree with expected results. Strict adherence to QA/QC and defined project procedures will produce more comparable data.

Comparability is an expression of confidence with which one data set can be compared to another. The objective of comparability is to ensure that data developed during the investigation are comparable to Site knowledge and adequately address applicable criteria or standards established by the USEPA and NDEP. This QAPP addresses comparability by specifying laboratory methods that are consistent with the current standards of practice, as approved by the USEPA and NDEP and by adhering to strict QA/QC procedures. Field methods are discussed in the FSSOP (BRC, ERM and MWH 2007) and adhere to practices consistent with the policies of the NDEP.

A8. SPECIAL TRAINING/CERTIFICATIONS

All field personnel will be certified as required by the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard provided in 29 CFR 1910.120 (USEPA 1990), which sets forth training requirements for hazardous waste clean up, treatment, and emergency response for field activities. HAZWOPER training includes both a one-time 40-hour training and annual eight-hour refresher courses to maintain current certification. All field activities will be supervised by a State of Nevada C.E.M. All respective laboratories performing analytical testing of Site samples will be certified to do so by NDEP. It should be noted that the Site has a number of unique analytes and a Nevada-certified laboratory may not be available for some of the analyses. These analytes will be discussed with NDEP and handled on a case-by-case basis.

All statistical analyses, geostatistics, human health and ecological risk assessments, and hydrologic and hydrogeologic modeling must be performed by individuals well versed in these fields. Such individuals shall have an undergraduate degree in the appropriate discipline or equivalent. Records of certification will be maintained with the QA Manager's project file.

A9. DOCUMENTATION AND RECORDS

Records will be maintained documenting all activities and data related to sample collection and laboratory analyses. Results of data verification and validation activities will also be documented. Procedures for documenting these activities are described in this section.

Each SAP/FSP, this QAPP, and the Health and Safety Plan (HSP; BRC and MWH 2005) will be provided to every project participant listed in Section A4. Any revisions or amendments to any of these documents will also be provided to these individuals. This QAPP will be reviewed and updated on an annual basis throughout the duration of the project. Any changes to the document must be approved by all signatory stakeholders and an updated QAPP will be provided to all project participants.

A9.1 Field Documentation

All records of field operations will be maintained in the project file in BRC's Henderson, Nevada office. This includes any field logs, sampling records, sample chain-of-custody, laboratory reports, maps, drawings, and data compilations and statistical evaluations performed as part of any sampling and analysis program. The following field records will be maintained throughout the duration of sampling activities:

- Field log books
- Field data forms
- Sample description forms
- Soil core logs
- Sample labels
- Sample chain-of-custody forms
- Photographic documentation.

The content and use of these documents will be described in each SAP/FSP.

The following reports will be completed, as necessary, to document an audit or a deviation from a SAP/FSP or this QAPP:

- Corrective action reports will be used, as necessary, to document any problems encountered during field activities and corrective actions taken.
- Field change request forms will be used, as necessary, to document the need for a procedural change or a sample location change.
- System and performance audit reports will be used, as necessary, to document review or audit of field sampling activities.

The representative investigation consultant will ensure that the field team receives the final, approved version of each SAP/FSP and this QAPP prior to the initiation of field activities.

A9.2 Laboratory Documentation

All activities and results related to sample analysis will be documented at each laboratory. Internal laboratory documentation procedures are described in the Laboratory Quality Assurance Plans (Appendix B).

Each laboratory will provide a data package for each sample delivery group or analysis batch that is comparable in content to a full Contract Laboratory Program (CLP) package. The format of the data may differ from CLP requirements. Each data package will contain all information required for a complete QA review, including the following:

- A cover letter discussing analytical procedures and any difficulties that were encountered.
- A case narrative referencing or describing the procedures used and discussing any analytical problems and deviations from SOPs and this QAPP.
- Chain-of-custody and cooler receipt forms.
- A summary of analyte concentrations, MRLs, and method detection limits (MDLs).
- Laboratory data qualifier codes appended to analyte concentrations, as appropriate, and a summary of code definitions.
- Sample preparation and cleanup logs.
- Instrument tuning check data.

- Initial and continuing calibration data, including instrument printouts and quantification summaries, for all analytes.
- Results for method and calibration blanks.
- Summary forms with results for all QA/QC checks, including but not limited to surrogate spikes, internal standards, LCS, matrix spike samples, MSD samples, and laboratory duplicate samples.
- Instrument data quantification reports for all analyses and samples.
- Copies of all laboratory worksheets and standards preparation logs.

The laboratory is required to maintain all records, calculations, raw data, and magnetic back up tapes for all sample analyses for a period of five years. Unless otherwise notified, samples and sample extracts will be retained by the laboratory for a minimum of 30 days after a written report is issued to BRC or designee. The laboratory will dispose of excess or unused samples in a manner consistent with appropriate government regulations.

Data will be delivered in both hard-copy and electronic format to the BRC QA Manager, who will be responsible for oversight of data verification and validation, and for archiving the final data and data quality reports in the project file. BRC will maintain data packages and electronic data deliverables (EDDs) for chemical analyses. All data will be copied to NDEP both in the form of laboratory reports and EDDs using EarthSoft's EQuIS® data system format.

A9.3 Data Quality Documentation

Data validation reports will be prepared by the contracted validation firm and provided to the BRC QA Manager. Results of the validation reports will be summarized in the applicable site characterization summary report for each sampling event. Any limitations to the usability of the data will also be discussed in this report.

All electronic database entries provided by each laboratory will be verified against the validated hard-copy data in the data package. All changes to the database will be documented in an electronic log file that automatically enters a current time stamp when opened and allows the data editor to enter notes about changes to the database. Any data tables prepared from the database will include all qualifiers that were applied by the laboratories and during data validation, unless otherwise requested.

B DATA GENERATION AND ACQUISITION

B1. SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)

A number of field investigation and remediation activities are anticipated for the project. Environmental sampling includes the collection of surface water, sediment, soil, porewater, and groundwater samples; several geophysical and water quality surveys may also be performed. Project sampling and field documentation procedures, as well as the objectives of each sample task, are detailed in each respective SAP/FSP. The purpose of each SAP/FSP is to ensure that samples are collected, handled, and documented correctly prior to analysis. Each SAP/FSP will include, at a minimum, the following information:

- Description of the field activities that will take place, including a discussion of purpose and objectives.
- Preparation and mobilization procedures for the particular field activity, including permitting requirements and utility clearance.
- Complete, detailed account of all anticipated field activities (*e.g.*, soil boring locations and procedures, soil sample collection, well installation, groundwater sampling).
- Soil sample and monitoring well nomenclature.
- Analytical methods, QA/QC procedures, and field equipment and field instrument operations and reporting requirements.

B2. SAMPLING METHODS

The defensibility of data is dependent on the use of well defined, accepted sampling procedures. Sampling method details not provided here are included in the respective SAPs/FSPs and SOPs. Collection of environmental samples of high integrity is important to the quality of chemical data generated. Sampling SOPs for field activities have been developed and are contained in the project FSSOP manual (BRC, ERM and MWH 2007). The procedures are discussed in each SAP/FSP, along with additional procedures necessary to complete the proposed field program.

B3. SAMPLE HANDLING AND CUSTODY

Detailed procedures for sample identification, handling, documentation, custody, and ultimate disposal are presented in each SAP/FSP. The following provides a brief discussion of these procedures.

B3.1 Sample Containers, Preservation, and Holding Times

Table 3 lists the required sample containers, preservatives, and recommended maximum holding times for samples. Sample containers provided by the laboratory for this project will have been purchased commercially by the laboratory from I-Chem, Eagle Pitcher, or other equivalent source.

B3.2 Sample Handling and Storage

In the field, each sample container will be marked with identifying information, such as the sampling location number, date and time of sample collection, analysis required, depth of sample, preservative (if any), and other identifying information, as applicable to the particular sampling. Sample labels will be filled out with indelible ink. All sample containers will be wiped with paper towels and securely packed in a chilled cooler with ice, in preparation for delivery to the laboratory. The ice will be bagged in zip-top style plastic bags to prevent water leakage.

Upon receipt of the samples, the laboratory will immediately notify the Field Manager if conditions or problems are identified that require immediate resolution. Such conditions may include: container breakage, missing or improper chain-of-custody, exceeded holding times, missing or illegible sample labeling, or temperature excursions.

B3.3 Sample Custody

For each sample submitted to the laboratory for analysis, an entry will be made on a chain-of-custody form supplied by the laboratory. The information to be recorded includes the sampling date and time, sample identification number, matrix type, requested analyses and methods, preservatives, and the sampler's name. Sampling team members will maintain custody of the samples until they are relinquished to laboratory personnel or a professional courier service.

Custody is described as:

- The sample is in one's actual physical possession;

- The sample is in one's clear field of view after being in one's physical possession;
- The sample is in one's physical possession and is then locked up in a secure, tamper-proof container; or
- The sample is kept in a secured area that can be accessed by authorized personnel only.

The chain-of-custody form will accompany the samples from the time of collection until received by the laboratory. Each party in possession of the samples (except the professional courier service) will sign the chain-of-custody form to signify receipt. The chain-of-custody form will be placed in a plastic bag and shipped with samples inside the cooler. After samples have been placed in the cooler, packed for shipment, and completed with chain-of-custody documentation, the cooler will be sealed with packing tape and affixed with a custody seal. The seal will be either a laboratory-provided custody seal or similar label that is completed with the samplers' signature and affixed across the cooler lid and base to provide evidence that the cooler was not opened during transit. The custody seal should be taped over with packing tape such that it cannot be removed without being destroyed. This procedure will not be required for coolers that are hand delivered to the analytical laboratory by the sampler.

The laboratory will provide a copy of the original, completed custody form with the analytical report of results to the entity specified on the chain-of-custody form. Upon receipt, the laboratory will inspect the condition of the sample containers and report all relevant information on the chain-of-custody or similar form, such as an internal laboratory sample log-in form.

B4. ANALYTICAL METHODS

Laboratory methods to be used are consistent with requirements provided in SW-846 (USEPA 2004b), USEPA protocols and guidelines, and other established and widely accepted protocols. Modifications will be made to these methods, as necessary and technically feasible, to improve MRLs. The current analyte list, based on site-related chemicals (SRCs) identified for the project, and analytical methods to be used for this project are listed in Table 4. The total number of samples and the analyses that will be conducted on each sample will be indicated in each SAP/FSP. Specific analytical method procedures are detailed in the laboratory QA Plan and SOPs of the selected laboratory. These documents may be reviewed by project QA staff during laboratory or data audits to ensure that project specifications are met.

B4.1 Internal Standards

Internal standards are measured amounts of method-specified compounds added after preparation or extraction of a sample. Internal standards are added to samples, controls, and blanks, in accordance with method requirements, to identify column injection losses, purging losses, or viscosity effects.

Acceptance limits for internal standard recoveries are set forth in the applicable method. If the internal standard recovery falls outside of acceptance criteria, the instrument will be checked for malfunction and reanalysis of the sample will be performed after any problems are resolved.

B4.2 Retention Time Windows

Retention time windows will be established as described in SW-846 Method 8000A (USEPA 2004b) for applicable analyses of organic compounds. Retention time windows are used for qualitative identification of analytes and are calculated based on multiple, replicated analyses of a respective standard.

Retention times will be checked on a daily basis. Acceptance criteria for retention time windows are established in the referenced method. If the retention time falls outside the respective window, corrective action such as recalibration and reanalysis will be taken to correct the problem. The instrument must be re-calibrated after any retention time window failure and the affected samples must be reanalyzed.

B4.3 Method Detection Limits

The MDL is the minimum concentration of an analyte or compound that can be measured and reported with 99 percent confidence that the concentration is greater than zero. MDLs are established for each method, matrix, and analyte, and for each instrument used to analyze project samples. MDLs are derived using the procedures described in 40 CFR 136 Appendix B (USEPA 1990). USEPA requires that MDLs be established on an annual basis. The laboratory must use current MDLs to establish the laboratory reporting limits used for reporting purposes. The laboratories must be able to meet acceptable analysis-specific MDLs for project work.

B4.4 Special Quantitation Methods for Short-Lived Radionuclides

For several “short-lived” radionuclides compounds indicated in Table 4, the basis for quantitation will be “back-quantitation” from parent radionuclides. This specific group of

exceptional radionuclides represents those compounds with relatively short half-lives ranging from seconds to days. It is recognized that for these radionuclides of interest any measured concentration in the sample may not reflect the predicted presence.

B5. QUALITY CONTROL

This section presents QC requirements relevant to analysis of environmental samples that will be followed during all project analytical activities. The purpose of the QC program is to produce data of known quality that satisfy the project objectives and that meet or exceed the requirements of the standard methods of analysis. This program provides a mechanism for ongoing control and evaluation of data quality measurements through the use of QC materials.

B5.1 Quality Control Procedures

The chemical data collected as part of any project sampling effort will be used to determine the nature and extent of contamination, and potentially to support further evaluations, such as risk assessment. Therefore, it is critical that the chemical data be of the highest confidence and quality. Consequently, QA/QC procedures will be strictly adhered to. These procedures include:

- Adherence to established protocols for field sampling, decontamination procedures, and analytical methods;
- Collection and laboratory analysis of appropriate field equipment and trip blanks to monitor for possible contamination of samples in the field or the laboratory;
- Collection and laboratory analysis of matrix spike, MSD, and field duplicate samples to evaluate precision and accuracy; and
- Attainment of both qualitative and quantitative completeness goals.

B5.1.1 Equipment Decontamination

Non-dedicated equipment will be decontaminated before and after each sample is collected. The equipment will be washed in a non-phosphate detergent and potable water, rinsed in potable water, and then double rinsed in contaminant-free reagent water. The specific methodologies to maximize proper decontamination of non-dedicated sampling equipment are presented in each applicable sampling SOP (BRC, ERM and MWH 2007).

B5.1.2 Standards and Reagents

Standards used for calibration and reagents to prepare samples will be certified by the National Institute of Standards and Technology (NIST), USEPA, or other equivalent source. The standards and reagents will be within their expiration dates. The expiration date will be established by the manufacturer, or based on chemical stability, the possibility of contamination, and environmental and storage conditions. Standards and reagents will be labeled with expiration dates, and will reference primary standard sources, if applicable. Expired standards or reagents will be discarded.

B5.1.3 Supplies

All supplies will be inspected prior to their use in the field or laboratory. The descriptions for sample collection and analysis contained in the methods will be used as a guideline for establishing the acceptance criteria for supplies. A current inventory and appropriate storage system for these materials will ensure their integrity prior to use. Efficiency and purity of supplies will be monitored through the use of standards and blank samples.

B5.1.4 Holding Time Compliance

Sample preparation and analysis will be completed within the required method holding times (Table 3). Holding time begins at the time of sample collection. If an analysis is performed on a sample that has exceeded its holding time, the associated results will be qualified as described in the applicable validation procedure (USEPA 1999 and 2004a). The following definitions of extraction and analysis compliance are used to assess holding times:

- Preparation or Extraction Completion: Completion of the sample preparation process as described in the applicable method, prior to any necessary extract cleanup.
- Analysis Completion: Completion of all analytical runs, including dilutions, second-column confirmations, and any required re-analyses.

The laboratory will notify the BRC QA Manager upon exceeding holding times for any requested sample analysis. The laboratory will not perform any analysis outside of method recommended holding times without written consent.

B5.1.5 Preventive Maintenance

The Field Manager is responsible for documenting the maintenance of all field equipment prescribed in the manufacturer's specifications. Field personnel will perform scheduled maintenance as appropriate or required by the equipment manufacturer. Procedures specific to the calibration, use, and maintenance of field equipment will be presented in the respective sampling plan. The analytical laboratory is responsible for all laboratory equipment calibration and maintenance as described in their laboratory QA Plan. Subcontractors are responsible for maintenance of all equipment needed to carry out subcontracted duties.

B5.1.6 Special Training and Certifications

All field personnel will be certified as required by the HAZWOPER standard provided in 29 CFR 1910.120 (USEPA 1990), which sets forth the training requirements for hazardous waste clean-up, treatment, and emergency response for field activities. HAZWOPER training includes both a one-time 40-hour training and annual eight-hour refresher courses to maintain current certification. All field activities will be supervised by a C.E.M. in the State of Nevada. All respective laboratories performing analytical testing of Site samples will be certified to do so by NDEP.

B5.2 Quality Assurance and Quality Control (QA/QC) Samples

The purpose of the QA/QC program is to produce data of known quality that satisfy the project objectives and that meet or exceed the requirements of the standard methods of analysis. This program provides a mechanism for ongoing control and evaluation of data quality measurements through the use of QC materials. QA/QC samples will be collected as part of the overall QA/QC program.

B5.2.1 Laboratory Reagent Blanks

A laboratory reagent blank is contaminant-free reagent water that is prepared and analyzed by the laboratory in the same manner as an environmental sample. Analysis of the reagent blank indicates potential sources of contamination from laboratory procedures (*e.g.*, contaminated reagents, improperly cleaned laboratory equipment, or persistent contamination due to presence of certain compounds in the ambient laboratory air). A reagent blank will be analyzed once per every 20 samples, or at least once each day for each method used by the laboratory for that day.

B5.2.2 Field Equipment Blanks

A field equipment blank is a sample that is prepared in the field by pouring contaminant-free reagent water into previously cleaned sampling equipment. The water is then prepared and analyzed in the same manner as an environmental sample. Field equipment blanks are typically submitted blind (given a fictitious name so that the laboratory will not recognize it as a blank). The field equipment blank gives an indication of contamination from field procedures (*e.g.*, improperly cleaned sampling equipment or cross-contamination). Field equipment blanks will be collected at a minimum frequency of at least one per 20 samples, or five percent of primary field samples, when non-dedicated equipment is utilized. Field equipment blanks will be prepared and analyzed for the same analysis suite as the associated primary samples collected.

Decontamination procedures will be used in association with all non-dedicated sample collection equipment prior to collection of field equipment blank samples. For *in-situ* water sampling, non-dedicated field sample collection equipment will be limited to the sampling device of the selected equipment that acts as a direct sample collection device. For sampling of groundwater monitoring wells, non-dedicated field sample collection equipment will be limited to the pump that is used for purging of groundwater wells. For soil sampling, non-dedicated field sample collection equipment includes the specific device used for obtaining the sample. Various types of soil sampling devices are described in the applicable SOP (BRC, ERM and MWH 2007).

B5.2.3 Trip Blanks

Trip blanks monitor for contamination due to handling, transport, cross contamination from other samples during storage, or laboratory contamination. Positive detections in the trip blank sample results may indicate contamination of samples during the transport or handling process. Sample detections at similar concentrations as those reported in associated trip blank samples are considered suspect. These results may be qualified as non-detected during the data validation. In the event that detections of target analytes, other than USEPA-identified common laboratory contaminants, are consistently reported in trip blank samples, adjustments to packing and handling may be implemented.

Trip blanks serve as a mechanism of control for sample bottle preparation, blank water quality, and sample handling. They are generally submitted to the laboratory for analysis of VOCs and only accompany sample shipments where environmental samples are to be analyzed for VOCs.

The trip blank consists of a VOC sample vial filled in the laboratory with American Society of Testing and Materials (ASTM) Type II reagent-grade water. The trip blank accompanies the empty sample bottles to the site and returns with the collected field samples in an effort to simulate sample handling and transportation conditions. Trip blanks are opened only by laboratory personnel. One trip blank will be included in each shipping container transporting samples for VOCs analysis. Examples of potential sources of contamination in trip blanks include the following:

- Laboratory reagent water;
- Sample containers;
- Cross-contamination during shipment;
- Ambient air, or contact with analytical instrumentation during preparation and analysis at the laboratory; and
- Laboratory reagents used in analytical procedures.

If compounds are detected in the trip blank, the appropriate validation flag, as described in the applicable validation procedure (USEPA 1999) and SOP-40 (BRC, ERM and MWH 2007), will be applied to the associated sample results. Other issues affecting the use and integrity of trip blanks include the following:

- Handling: Trip blanks may be held on the Site for a maximum of one week. The temperature of the trip blanks during storage will be maintained at 4 °C + 2 °C. A temperature blank will be included in the cooler to verify that the temperature requirement is not exceeded. Expired trip blanks will be returned to the laboratory for disposal.
- Holding Time: The holding time clock for analysis of trip blanks begins at the time of sample collection of the oldest sample in the set.

B5.2.4 Matrix Spike Samples

Matrix spikes are performed by the analytical laboratory to evaluate the efficiency of the sample extraction and analysis procedures, and are necessary because interference from the sample matrix 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 target compounds

to a sample. The sample 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. Matrix spike recoveries are reviewed to check that they are within acceptable range. However, the acceptable ranges vary widely with both sample matrix and analytical method.

Matrix spikes and MSDs will be analyzed by the laboratory at a frequency of at least one per 20, or five percent of the primary field samples, whichever is greater. Typically, matrix spikes are performed in duplicate in order to evaluate the precision of the procedures as well as the accuracy. Precision objectives (represented by agreement between matrix spike and MSD recoveries) and accuracy objectives (represented by matrix spike recovery results) are based on statistically generated limits established annually by the analytical laboratory. It is important to note that these objectives are to be viewed as goals, not as criteria. If matrix bias is suspected, the associated data will be qualified and the direction of the bias indicated in the data validation report.

B5.2.5 Field Duplicate Samples

Soil and water field duplicate samples will be collected and analyzed to evaluate sampling and analytical precision. Field duplicates are collected and analyzed in the same manner as the primary samples. Agreement between duplicate sample results will indicate good sampling and analytical precision. Specific locations will be designated for collection of field duplicates prior to the start of field activities. Field duplicates will be collected at a frequency of 10 percent, or one per 10 samples of the primary samples collected. The duplicate sample will be analyzed for all laboratory analyses requested for the primary sample collected. The precision goal for field duplicate analyses will be plus or minus 50 percent RPD for solid and aqueous samples.

B5.2.6 Performance Evaluation Samples

Double blind performance evaluation (PE) samples may be submitted to the analytical laboratory at any time. These samples will be of both soil and water matrices and are used to assess the accuracy of analytical procedures employed by the laboratory. However, because laboratories are

licensed by the State of Nevada as certified testing laboratories,[1] and participate in an approved Performance Evaluation Program, no PE samples are anticipated for the project.

B6. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Analytical instrument testing, inspection, maintenance, setup, and calibration will be conducted by each laboratory in accordance with the requirements identified in the laboratory SOPs and manufacturer instructions. Instrument maintenance and repair will be documented in maintenance logs or record books.

Audit programs are established and will be directed by the project QA staff to ensure that field and laboratory activities are performed in compliance with project controlling documents. This section describes responsibilities, requirements, and methods for scheduling, conducting and documenting audits of field and laboratory activities.

B6.1 Field Audits

Field audits focus on the appropriateness of personnel assignments and expertise, availability of field equipment, adherence to project controlling documents for sample collection and identification, sample handling and transport, use of QA samples, chain of custody procedures, equipment decontamination and documentation. Field audits are not required, but will be performed in the event significant discrepancies are identified that warrant evaluation of field practices. NDEP will be consulted prior to the performance of any field audits for the project.

B6.2 Laboratory Audits

Laboratory audits include reviews of sample handling procedures, internal sample tracking, SOPs, analytical data documentation, QA/QC protocols, and data reporting. Because selected laboratories are licensed by the State of Nevada as certified testing laboratories and participate in an approved Performance Evaluation Program, no laboratory audits will be performed.

[1] It should be noted that the Site has a number of unique analytes and a Nevada-certified laboratory may not be available for some of the analyses. These analytes will be discussed with NDEP and handled on a case-by-case basis.

B6.3 Data Audits

Data audits will be performed on analytical results received from the laboratories. These audits will be accomplished through a process of data validation, as described in Section D1, or may involve a more detailed review of laboratory analytical records. Data audits require the laboratory to submit complete raw data files for validation and verification. Professional chemists will perform a review of the data as described in Section D1. This level of validation consists of a complete and comprehensive review of sample data and results of QC samples to assess if these data are consistent with method requirements. Upon request, the laboratory will make available all supporting documentation, or associated magnetic media, in a timely fashion.

B6.4 Scheduling

Audits will be scheduled such that field and laboratory activities are adequately monitored, or in the event discrepancies are identified. The overall frequency of audits conducted for these activities will be based on the importance and duration of work, as well as significant changes in project scope or personnel.

B6.5 Reports to Management and Responsibilities

Upon completion of any audit, the auditor will submit to the Project Manager a report or memorandum describing any problems or deficiencies identified during the audit. It is the responsibility of the Project Manager to determine if the deviations will result in any adverse effect on the project conclusions. If it is determined that corrective action is necessary, the procedures outlined in Section C1 will be followed.

B7. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Analytical instruments will be calibrated in accordance with the procedures specified in the applicable method. All analytes that are reported shall be present in the initial and continuing calibrations, and these calibrations must meet the acceptance criteria specified in the reference method. Records of standard preparation and instrument calibration will be maintained. Records shall unambiguously trace the preparation of standards and their use in calibration and quantitation of sample results. Calibration records will be traceable to standard materials as described in Section B5.1.2.

At the onset of analysis, instrument calibrations will be checked using all of the analytes of interest. At a minimum, calibration criteria will satisfy method requirements. Analyte concentrations can be determined with either calibration curves or response factors, as defined in the method. Guidance provided in SW-846 (USEPA 2004b), or applicable method, will be considered to determine appropriate evaluation procedures.

All calibration standards will be obtained from either the USEPA repository or a commercial vendor, and the laboratory will maintain traceability to the NIST. Stock standards will be used to make intermediate standards and calibration standards. Special attention will be given to expiration dating, proper labeling, proper refrigeration, and prevention of contamination. Documentation relating to the receipt, mixing, and use of standards will be recorded in a laboratory log book.

B8. INSPECTION/ACCEPTANCE FOR SUPPLIES AND CONSUMABLES

The quality of supplies and consumables used during sample collection and laboratory analysis can affect the quality of the project data. All equipment that comes into contact with the samples and extracts must be sufficiently clean to prevent detectable contamination, and the analyte concentrations must be accurate in all standards used for calibration and QC purposes. All supplies and consumables used for this investigation will be obtained through an appropriate supplier and will meet any applicable supply-specific requirements. All supplies and consumables will be inspected prior to use. Any product that does not meet applicable requirements will be returned to the supplier for replacement or will be discarded. Supply specific requirements include, but are not limited to, the following:

- Blank water will be certified analyte-free and analytical results will be provided for each lot.
- Decontamination and preservation chemicals will be ultra-pure grade or pesticide grade, as applicable. Certifications will be obtained from the supplier.
- Sampling equipment will be constructed of approved materials.

During sample collection, solvents of appropriate, documented purity will be used for decontamination. Solvent containers will be dated and initialed when they are opened. The quality of laboratory water used for decontamination will be documented at the laboratory that provides that water. As discussed in Section B3, cleaned and documented sample containers will

be provided by the laboratories. All containers will be visually inspected prior to use, and any suspect containers will be discarded.

Reagents of appropriate purity and suitably cleaned laboratory equipment will also be used for all stages of laboratory analyses. Details for acceptance requirements for supplies and consumables at the laboratories are provided in the laboratory SOPs and Quality Assurance Plans (Appendix B). All supplies will be obtained from reputable suppliers with appropriate documentation or certification. Supplies will be inspected to confirm that they meet use requirements, and certification records will be retained by BRC (*i.e.*, for supplies used in the field) or the laboratories.

B9. NON-DIRECT MEASUREMENTS

There are several non-direct measurements that may be used during various investigations. These include historical data for various media, and environmental fate and transport modeling. The details regarding the evaluation of these measurements and how they will be used are described in detail in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007). Existing chemical data from previous investigations may be used. All historical data will be reviewed for QA and data validation prior to use.

B10. DATA MANAGEMENT

This section presents the plan for data management, data review, and data reporting relevant to the data produced during all project analytical activities. This plan ensures that data are correct, readily available, and of the quality necessary to support the DQOs described in this QAPP. The project Data Management Plan is presented in Appendix C.

B10.1 Field Data

Data measured by field instruments will be recorded in field notebooks, laptop computers, and/or on required field forms. Examples of field documentation forms are included in the task-specific work plan and will be used during all sample collection efforts. Units of measure for field analyses are identified on the field forms. The field data will be reviewed by the Field Manager and/or Task Manager to evaluate completeness of the field records and appropriateness of the field methods employed. All field records will be retained in the project files.

B10.2 Laboratory Data

Analytical data will contain the necessary sample results and QC data to evaluate the DQOs defined for the project. Documentation requirements for laboratory data are defined in USEPA Region 9 *Draft Laboratory Documentation Requirements for Data Validation* (USEPA 1997). Laboratory reports will be consistent with USEPA Level IV documentation for 100 percent of the samples analyzed by the laboratory, and will include the following data and summary forms:

- Narrative, cross-reference, chain of custody, and method references;
- Analytical results;
- Surrogate recoveries (as applicable);
- Blank results;
- LCS recoveries;
- Duplicate sample results or duplicate spike recoveries;
- Sample spike recoveries;
- Summary of internal standards recoveries;
- Summary of initial and continuing calibration standards recoveries and raw data;
- Summary of initial and calibration blank concentrations and raw data;
- Analytical run logs;
- Sample preparation logs;
- Standard preparation logs; and
- Instrument raw data for the reported sample set.

B10.3 Electronic Data Management

ERM will maintain a project database for chemistry data. The BRC Data Manager is responsible for the maintenance of the project chemistry database. Each laboratory will provide analytical data in electronic format for storage in the project analytical database. The BRC Data Manager

will amend the project database with each new set of data provided by the laboratory, perform accuracy checks between the hardcopy and electronic data reports, and maintain any data qualifiers resulting from data validation activities.

The project database is supported by EarthSoft's EQuIS® Data Management System. The relational database program is written in Visual Basic and uses the Microsoft Access engine. Sample, test, and result data are electronically and manually imported directly into the EQuIS® database. Once data have been entered and all QC reviews have been performed, queries can be generated and data interfaced with industry-standard products for visualization, graphing, and reporting. Specific details for data management are provided in the Data Management Plan in Appendix C.

B10.4 File Storage

Data collected as part of any activities conducted at the Site will be stored in a central file system in the respective contractor's offices. In accordance with their own QAPP, the laboratory will also maintain a filing system for documents necessary to support the analytical processes. Archiving of project data is discussed in the Data Management Plan (Appendix C).

B10.5 Reporting

Reports of any data resulting from a given investigation or subsequent evaluations will be provided in accordance with the task-specific work plan, as approved by NDEP. The reports may contain data, evaluations, and conclusions to meet the purpose of the report. The reporting schedule will be provided in the work plan.

C ASSESSMENT AND OVERSIGHT

A formal chain of communication has been established for this project to optimize the flow of information and to keep the project team apprised of activities and events. The field team will stay in close verbal contact with the BRC Project Manager during all phases of the project. These individuals will, in turn, keep NDEP representatives informed of any significant developments in the field or at the laboratories.

C1. ASSESSMENTS AND RESPONSE ACTIONS

Corrective actions will be initiated whenever DQIs suggest that DQOs have not been met. Corrective actions will begin with identifying the source of the problem. Potential problem sources include failure to adhere to method procedures, improper data reduction, equipment malfunctions, or systemic contamination. The first level of responsibility for identifying the problems and initiating corrective action lies with the analyst/field personnel. The second level of responsibility lies with any person reviewing the data. Corrective actions may include more intensive staff training, equipment repair followed by a more intensive preventive maintenance program, or removal of the source of systemic contamination. Corrective action policies for laboratory procedures are discussed in the laboratory Quality Assurance Plans provided in Appendix B. Once resolved, any corrective action implemented will be fully documented and, if DQOs were not met, any samples in question will be recollected and/or reanalyzed using a properly functioning system.

C2. REPORTS TO MANAGEMENT

A field sampling report will be prepared and submitted to NDEP within 90 days of completing each type of sampling event and data review/validation. Field sampling reports will summarize field sampling activities, including sampling locations (maps), requested sample analyses, sample collection methods, and any deviations from the SAP/FSP and QAPP.

Data packages and EDDs will be prepared by the laboratory upon completion of analyses for each sample delivery group. The case narrative will include a description of any problems encountered, control limit exceedances, and rationale for any deviations from protocol. Copies of corrective action reports generated at the laboratory will also be included with the data package.

A data validation report will be prepared for each data package by the data validation firm. These reports and the validated data will be provided to the BRC QA Manager when validation is completed for each package. A summary of any significant data quality issues will be provided to USEPA with the data submittal for each sampling effort.

The laboratories will keep the BRC QA Manager apprised of their progress on a weekly basis. The laboratories will provide the following information:

- Inventory and status of samples held at the laboratory, in spreadsheet format by sample delivery group

- Summaries of out-of-control laboratory QC data and any corrective actions implemented
- Descriptions and justification for any significant changes in methodology or QA/QC procedures.

The laboratories have implemented routine systems of reporting non-conformance issues and their resolution. These procedures are described in the laboratory Quality Assurance Plans (Appendix B). Laboratory non-conformance issues will also be described in the applicable site characterization summary report for each sampling event if they affect the quality of the project data.

The status of field and laboratory activities will be provided to NDEP project managers on a routine basis. The following information will be included in this report:

- Actions taken
- Status of field and laboratory data
- Scheduled events for the following two months
- Problems encountered, anticipated delays, and solutions
- Documents and issues awaiting NDEP's response.

This report will be prepared by BRC and/or its consultants and will be supplied to NDEP by BRC Project Manager.

D DATA VALIDATION AND USABILITY

Data generated in the field and at the laboratories will be verified and validated according to criteria and procedures described in this section. Data quality and usability will be evaluated, and a discussion will be included in the applicable site characterization summary report for each sampling event.

D1. DATA REVIEW, VERIFICATION, AND VALIDATION

Guidance for data review and validation is provided in USEPA's National Functional Guidelines (USEPA 1999 and 2004a) and SOP-40 (BRC, ERM and MWH 2007). SOP-40 was designed to be consistent with and at least as rigorous as the National Functional Guidelines. These guidance

manuals provide direction for the data review and validation activities to be conducted for all data collection activities. All data will undergo a standard QC review, as described in this section. Should a more vigorous review be warranted for a specified data set, data validation will include a review of raw data submitted by the laboratory to verify instrument calibration, performance data, and recalculation of sample results. At a minimum, 10 to 20 percent of the data will undergo validation consistent with the procedures described in the National Functional Guidelines and SOP-40.

Data validation criteria specified in SOP-40 (BRC, ERM and MWH 2007) for this project are derived from the National Functional Guidelines (USEPA 1999 and 2004a). The National Functional Guidelines provide specific data validation criteria that can be applied to the data type generated from an environmental investigation. Some data acquisition requirements may be less stringent; however, compliance in the above QC areas will assure useful data are obtained during any given sampling event.

Laboratory data will be reviewed for compliance with the applicable method and the quality of the data reported. To facilitate this data review, computerized data validation tools developed for EarthSoft's EQuIS® Data Management System will be employed. The following parameters summarize the specific criteria and scope of the standard data review:

- Data Completeness;
- Holding Times;
- Blanks;
- LCS;
- Matrix Spike/MSDs;
- Surrogates/Internal Standards (as applicable);
- Field QC Samples; and
- Compound Identification and Quantification.

The application of QC review criteria is a function of project-specific DQOs. The BRC QA Manager will determine if the DQOs for the analytical data have been met based on data that met and/or exceeded validation criteria. Results of the data validation review will be documented and

summarized together with the data. All resulting documentation will be maintained in the project files.

D1.1 Data Review

Data review involves verifying the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. Data that do not meet the acceptance criteria, such as accuracy, precision, and holding time, as described in this QAPP, will be qualified. The qualifier applied to the data will depend upon the severity of the exceedance. Data that are non-detected with exceeded holding times or exceptionally low spike (<10 percent) recoveries or as otherwise specified in SOP-40 (BRC, ERM and MWH 2007) will be rejected and deemed unusable. Data that are found to be outside of acceptance criteria and do not grossly exceed criteria will be qualified as estimated as specified in SOP-40 (BRC, ERM and MWH 2007). Data that are found to be associated with a contaminated blank sample will be qualified as non-detect following the National Functional Guidelines and SOP-40 (BRC, ERM and MWH 2007).

Data are reviewed for compliance with the pre-established project goals and limits defined by DQIs and applicable DQOs. Data that do not meet these goals or limits may require qualification to identify results that should be used with caution or should not be used for decision-making purposes.

- Case Narrative Review. Review the case narrative to ensure that any anomalies, deficiencies, or QC problems have been identified. Any corrective actions should also be discussed in the case narrative.

- Chain-of-Custody Review. Review the data package to ensure that an original copy of the chain-of-custody form has been included. Receipt signatures from laboratory personnel should be included on this form.

- Holding Time Review. Review extraction/preparation and analysis holding times for compliance with method or project-prescribed holding times.

- Matrix Spike Review. Review MS recoveries for compliance with project-specified limits, appropriate corrective actions, and potential interference from the sample matrix.

- LCS Review. Review LCS recoveries for compliance with project-specified limits, appropriate corrective actions, and to verify laboratory accuracy.

- Matrix Spike and Laboratory Duplicate Review. Review RPD calculations for compliance with project-specified limits, appropriate corrective actions, and to verify laboratory precision.

- Method Blank Review. Review method blank results for positive detections of target compounds and compare with positive sample detections for possible sample contamination.

- Trip, Field, and Equipment Rinsate Blank Review. Review trip, field, and/or rinsate blank sample results for positive detections of target compounds and compare with positive sample detections for possible sample contamination.

- Surrogate Review. Review surrogate recoveries for compliance with limits as listed in each laboratory's QA Plan to verify whether sample results were subject to interference from the sample matrix.

- Field Duplicate Sample Review. Review results for original and field duplicate samples for positive detections (the RPD is calculated for all positive detections and reviewed for agreement).

- Completeness Review. Compare the amount of valid, usable data to the amount of data collected to verify that completeness goals have been achieved.

- Comparability Review. Review data to verify that results are comparable and can be used without limitations.

- Representativeness Review. Review data set to verify that results are representative of site conditions.

D1.2 Data Validation

Validation differs from a standard review in that issues are identified through inspection of raw data. Data validation is a more thorough review process than the data review process described above. Data review will be performed for 100 percent of the data. Data validation will be performed for 100 percent of the data (reported with raw data at Level IV) that will be used in support of site characterization and subsequent evaluations; however, as a general rule of thumb, 100 percent of the data will undergo Level III data validation, and 10 to 20 percent will undergo Level IV data validation. The percentage and types of data to be validated will be defined in the

site-specific investigation work plan, SAP/FSP, and/or other work plan submitted to NDEP for each data collection activity.

Data validation involves verifying calculations and procedures performed to generate sample results. When possible, laboratory data will be validated in accordance with method requirements. In the absence of method-specific requirements, data may be validated according to CLP National Functional Guidelines. Project-specific calculations or algorithms are not anticipated for the project. Documentation requirements for performing data validation will be consistent with USEPA Region 9's publication entitled *Laboratory Documentation Requirements for Data Validation* (USEPA 1997).

In addition to the data verification requirements, data validation will include the following:

- Initial Calibration Review. Review initial calibration calculations for agreement with summary form results, linearity, and method-specified minimum requirements.
- Continuing Calibration Review. Review continuing calibration calculations for agreement with summary form results, linearity, and method-specified minimum requirements.
- Internal Standard Review. Review internal standard responses to ensure that minimum and maximum method-specified requirements are met and the correct internal standard has been assigned to target compounds and surrogates.
- Target Compound Identification Review. Review target compounds identified in project and QC samples and ensure that calculated concentrations and identifications are accurate.
- Contract-Required Detection Limit Sample Review. Review contract-required detection limits against sample results for project-specified limit requirements.
- Pattern Identification Review. Review any positive sample detections of target compounds that require pattern identification with a standard, including polychlorinated biphenyls and specific TPH fractions.

D1.3 Data Qualifiers

The data review and validation procedures were designed to review each data set, and identify biases inherent to the data, and determine its usefulness. Flags may be applied to those sample results that fall outside of specified tolerance limits and, therefore, did not meet the program's

QA objectives, as described in Section A7. Flags will indicate if results are considered anomalous, estimated, or rejected. Only rejected data are considered unusable for decision-making purposes; however, other qualified data may be used with limitations, or require further verification.

Flags to be used for this project are defined in SOP-40 (BRC, ERM and MWH 2007) and in the National Functional Guidelines and are listed below:

U — The analyte was analyzed for but was not detected above the reported sample quantitation limit, or the analyte was detected, but qualified as non-detected during data validation due to blank contamination.

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ — The analyte was not detected above the reported quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R — The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified.

J+ — Inorganics analyses: the result is an estimated quantity, biased high. The associated numerical value is the approximate concentration of the analyte in the sample.

J- — Inorganics analyses: the result is an estimated quantity, biased low. The associated numerical value is the approximate concentration of the analyte in the sample.

Project-specific qualifiers are described in SOP-40 and include:

X — The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

Z — The associated data has not been subjected to the data review/validation process.

J+ Organics analysis: the result is an estimated quantity, biased high. The associated numerical value is the approximate concentration of the analyte in the sample.

J- Organics analysis: the result is an estimated quantity, biased low. The associated numerical value is the approximate concentration of the analyte in the sample.

J-TDS Inorganic analysis: the analytical result is estimated based on failure of total dissolved solids correctness check performed in accordance with Standard Methods.

J-CAB Inorganic analysis: the analytical result is estimated based on failure of cation-anion balance check performed in accordance with Standard Methods.

J-, TDS/CAB Inorganic analysis: the analytical result is unreliable based on failure of cation-anion balance and TDS correctness checks performed in accordance with Standard Methods.

Sample results that were generated after the required holding time but less than two times after the holding time will be qualified as estimated (J or UJ). If the samples were prepared after two times the holding time was exceeded, non-detected results will be qualified as rejected (R), while detected results will be qualified as estimated, (J), as described in the appropriate guidance documents. Sample results that were generated with storage temperatures less than 2°C or greater than 6°C or as estimated (J) for the positive results and estimated or rejected (UJ or R) for non-detects based on an analyte-specific review.

SOP-40 shall be consulted for project-specific temperature exceedance qualifications. Non-detected volatile sample results should be rejected (R) if the sample temperature is considered to be at or above 15 ºC, and the sample shipment has arrived at the laboratory more than four hours after collection of the last sample, as stated in SOP-40. If this condition exists, detected sample results should be qualified as estimated with a low bias (J-).

The application of nonstandard qualifiers may be deemed necessary and used for atypical situations such as contamination of samples from a preservative. Nonstandard qualifier definitions (if applicable) are described in SOP-40 (BRC, ERM and MWH 2007) and will be included in the database. Data validation reason codes shall be assigned in the database to all qualifications and are described in SOP-40 (BRC, ERM and MWH 2007).

D1.4 Reconciliation with DQOs

During data review and validation, all data will be reconciled with the objectives set forth in this QAPP. As described in the above sections, all validation will be documented in an appropriate manner and data qualified to indicate when criteria are exceeded. Data not useful for inclusion in site evaluations will be clearly flagged as rejected. Other bias will be noted in the respective data validation memoranda to alert the data user to potential limitations. Data will also be reconciled with the respective project DQOs, as described in Section A7, as part of the evaluation and reporting of findings of the various investigations.

D2. VERIFICATION AND VALIDATION METHODS

Field data will be verified during preparation of samples and chain-of-custody forms. Field data and chain-of-custody forms will be reviewed on a daily basis by the Field Task Manager. After field data are entered into the project database, 100 percent verification of the entries will be completed to ensure the accuracy and completeness of the database. Any discrepancies will be resolved before the final database is released for use.

Procedures for verification and validation of laboratory data and field QC samples will be completed as described in SOP-40 (BRC, ERM and MWH 2007) and the following USEPA guidance documents for data validation:

- *Guidance on Environmental Data Verification and Validation* (USEPA 2002b)
- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA 1999)
- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA 2004a)
- *Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA 2005)

Control limits that will be used to qualify data are described in Section D1.3, above. Field and laboratory data for this project will undergo a formal verification and validation process. All entries into the database will be verified. All errors found during the verification of field data, laboratory data, and the database will be corrected prior to release of the final data.

Data verification and validation will be conducted in accordance with SOP-40 (BRC, ERM and MWH 2007), which is designed to be consistent with *Guidance on Environmental Data*

Verification and Validation (USEPA 2002b). Data verification and validation for organic compounds and metals will be completed according to methods described in the USEPA guidance for data review (USEPA 1999, 2004a,b). Performance-based control limits established by the laboratory and control limits provided in the method protocols will be used to evaluate data quality and determine the need for data qualification. Laboratory control limits for surrogate compounds, LCSs and LCSDs, and matrix spike/MSDs will be used for data validation.

No guidelines are available for validation of data for conventional analyses and physical testing. These data will be validated using procedures described in the functional guidelines for inorganic data review (USEPA 2004a) and SOP-40 (BRC, ERM and MWH 2007), as applicable. Results for field splits and replicates will be evaluated against a control limit of 50 percent. Equipment rinse blanks will be evaluated and data qualifiers will be applied in the same manner as method blanks, as described in the applicable USEPA guidance documents for data review (USEPA 1999, 2004a,b) and SOP-40 (BRC, ERM and MWH 2007). Data will be rejected if control limits for acceptance of data are not met (USEPA 1999, 2004a,b) and SOP-40 (BRC, ERM and MWH 2007).

In addition to verification of field and laboratory data and information, data qualifier entries into the database will be verified. Any discrepancies will be resolved before the final database is released for use. The accuracy and completeness of the database will be verified at the laboratory and again as part of data validation. All entries to the database from the laboratory EDDs will be checked against the hard-copy data packages.

D3. RECONCILIATION WITH USER REQUIREMENTS

The goal of data validation is to determine the quality of each data point and to identify data points that do not meet the project criteria. Nonconforming data may be qualified as undetected, estimated, or rejected as unusable during data validation if criteria for data quality are not met. Rejected data will not be used for any purpose. An explanation of the rejected data will be included in the applicable site characterization summary report for each sampling event.

Data qualified as estimated will be used for all intended purposes and will be appropriately qualified in the final project database. These data may be less precise or less accurate than unqualified data. The data users, in cooperation with BRC project management staff and the QA Manager, will evaluate the effect of the inaccuracy or imprecision of the qualified data on site assessment and risk assessment procedures used to evaluate the Site.

REFERENCES

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U.S. Environmental Protection Agency (USEPA). 2006. Guidance on Systematic Planning using the Data Quality Objectives Process. EPA QA/G-4. EPA/240/B-06/001. Office of Environmental Information, Washington, D.C. February.

TABLES

TABLE 1
BRC/BEC DOCUMENT DISTRIBUTION LIST

Document Name:

Name (Last, First) // Firm	Distribution		
	Hard Copy	e-Copy	Trans. Only
NDEP			
Rakvica, Brian			
Najima, Jim			
McGinley, Joe			
Hackenberry, Paul			
Copeland, Teri			
Black, Paul // Neptune			
Gratson, David // Neptune			
CoH			
Pohlmann, Brenda			
Conaty, Barry			
Clark County			
EPA			
Kaplan, Mitch			

Name (Last, First) / Firm	Distribution		
	Hard Copy	e-Copy	Trans. Only
Plants			
Crowley, Susan // Tronox			
Corbett, Pat // Tronox			
Wilkinson, Craig //TIMET			
Stowers, Kirk // Broadbent			
Landry, Larry // Pioneer			
Sylvia, Chris // Pioneer			
Crouse, George //Syngenta			
Erickson, Lee // Stauffer			
Kelly, Joe // Montrose			
Sundberg, Paul // Montrose			
Gibson, Jeff // Ampac			
Consultants			
Jones, Mark // ERM			
Quillin, Jill // ERM			
Cullen, Steve // DBS&A			
Corcoran, Greg // Geosyntec			
Hansen, Kyle // GES			
Management/Counsel			
Kellogg, Rick			
Paris, Mark			
Zimmermann, Steph			
Rice, Steve // RSRS			
Tundermann, David // PB&L			

TABLE 2
PRELIMINARY PROJECT SCREENING LEVELS
(Page 1 of 7)

Parameter of Interest	Analytical Method	Compound List	CAS Number	Preliminary Risk-Based Screening Levels (RBSLs)[1]										USEPA Region 9 PRGs[2]										OSHA PELs[5] (ppm / mg/m^3)	MCL (mg/L)[4]	Preliminary Ecological Screening Levels (ESLs)[3]				National AWQC (mg/L)[4]
				Commercial Worker RBSL (mg/kg)[4]	Basis	Maintenance Worker RBSL (mg/kg)[4]	Basis	Trespasser/ Recreational User RBSL (mg/kg)[4]	Basis	Construction Worker RBSL (mg/kg)[4]	Basis	Residential RBSL (mg/kg)[4]	Basis	Residential PRG (mg/kg)[4]	Basis	Industrial PRG (mg/kg)[4]	Basis	SSL (DAF = 20) (mg/kg)[4]	SSL (DAF = 1) (mg/kg)[4]	Ambient Air PRG (µg/m^3)[4]	Basis	Tap Water PRG (mg/L)[4]	Basis			USEPA Region 5 ESL (mg/kg)[4]	Terrestrial ESL (mg/kg)[4]	Aquatic ESL (mg/L)[4]	Tier II SCV (mg/L)[4]	
Ions	**EPA 300.0**	Bromide	24959-67-9	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Bromine	7726-95-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	0.1 / 0.7	--	--	--	--	--	--
		Chlorate	14866-68-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Chloride	16887-00-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	250	--	--	--	--	230
		Chlorine (soluble)	7782-50-5	9,369	NC	89,685	NC	204,540	NC	7,455	NC	7,333	NC	--	--	--	--	--	--	0.21	NC	--	--	(C)1 / (C)3	--	--	--	--	--	0.011
		Chlorite	14998-27-7	61,320	NC	34,067	NC	67,890	NC	9,291	NC	2,346	NC	--	--	--	--	--	--	--	--	--	--	--	1.0	--	--	--	--	--
		Fluoride	16984-48-8	>100,000	NC	68,133	NC	>100,000	NC	18,582	NC	4,693	NC	3,666	NC	36,938	NC	--	--	--	--	2.2	NC	-- / 2.5	4.0	--	--	--	--	--
		Nitrate (as N)	14797-55-8	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	--	--	--	--	--	--	--	--	10	NC	--	10	--	--	--	--	--
		Nitrite (as N)	14797-65-0	>100,000	NC	>100,000	NC	>100,000	NC	30,970	NC	7,821	NC	--	--	--	--	--	--	--	--	1.0	NC	--	1	--	--	--	--	--
		Orthophosphate	14265-44-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Sulfate	14808-79-8	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	250	--	--	--	--	--
	EPA 377.1	Sulfite	14265-45-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EPA 314.0	Perchlorate	14797-73-0	1,431	NC	795	NC	1,584	NC	217	NC	55	NC	7.8	NC	102	NC	--	--	--	--	0.0036	NC	--	0.018/0.0245[8]	--	--	--	--	--
Dissolved Gases	**RSK 175**	Ethane	74-84-0	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Ethylene	74-85-1	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Methane	74-82-8	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorinated Compounds	**EPA 551.1**	Chloral	75-87-6	>100,000	NC	>100,000	NC	>100,000	NC	30,970	NC	7,821	NC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Dichloroacetaldehyde	79-02-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCDDs/PCDFs	**EPA 8290**	OCDF (see 2,3,7,8-TCDD TEQ)	39001-02-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		OCDD (see 2,3,7,8-TCDD TEQ)	3268-87-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,4,6,7,8-HpCDF (see 2,3,7,8-TCDD TEQ)	67562-39-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,4,6,7,8-HpCDD (see 2,3,7,8-TCDD TEQ)	35822-46-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,4,7,8,9-HpCDF (see 2,3,7,8-TCDD TEQ)	55673-89-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,4,7,8-HxCDF (see 2,3,7,8-TCDD TEQ)	70648-26-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,4,7,8-HxCDD (see 2,3,7,8-TCDD TEQ)	39227-28-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,6,7,8-HxCDF (see 2,3,7,8-TCDD TEQ)	57117-44-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,6,7,8-HxCDD (see 2,3,7,8-TCDD TEQ)	57653-85-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,7,8,9-HxCDF (see 2,3,7,8-TCDD TEQ)	72918-21-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,7,8,9-HxCDD (see 2,3,7,8-TCDD TEQ)	19408-74-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,7,8-PeCDF (see 2,3,7,8-TCDD TEQ)	57117-41-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3,7,8-PeCDD (see 2,3,7,8-TCDD TEQ)	40321-76-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,3,4,6,7,8-HxCDF (see 2,3,7,8-TCDD TEQ)	60851-34-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,3,4,7,8-PeCDF (see 2,3,7,8-TCDD TEQ)	57117-31-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,3,7,8-TCDF (see 2,3,7,8-TCDD)	51207-31-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,3,7,8-TCDD (TEQ)	1746-01-6	3.8 E-5	C	1.8 E-5	C	1.5 E-4	C	1.3 E-4	C	3.9 E-6	C	3.9 E-6	C	1.6 E-5	C	--	--	4.5 E-8	C	4.5 E-10	C	--	0.00000003	2.0 E-7	2.0 E-7	--	--	--
Asbestos	**Elutriator/TEM**	Asbestos	1332-21-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	1 f per cc	7 MFL	--	--	--	--	--
General Chemistry Parameters	**EPA 350.2**	Ammonia (as N)	7664-41-7	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	--	--	--	--	--	--	104	NC	--	--	50 / 35	--	--	--	--	--	--
	EPA 335.1/335.2	Cyanide (Total)	57-12-5	40,880	NC	22,711	NC	45,260	NC	6,194	NC	1,564	NC	1,222	NC	12,313	NC	--	--	--	--	0.73	NC	-- / 5	0.2	--	--	--	--	0.0052
	EPA 345.1	Iodine	7553-56-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	(C)0.1 / (C)1	--	--	--	--	--	--
	EPA 9045C	pH in soil	pH	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EPA 9040B	pH in water	pH	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	6.5-9[11]	--	--	--	--	6.5-9
	EPA 376.1/376.2	Sulfide	18496-25-8	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002
	Mod. EPA 415.1	Total inorganic carbon	7440-44-0	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EPA 351.2	Total Kjeldahl nitrogen (TKN)	TKN	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EPA 415.1	Total organic carbon (TOC)	7440-44-0	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals	**EPA 6020/6010B**	Aluminum	7429-90-5	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	76,148	NC	76,142	NC	100,000	MAX	--	--	5.1	NC	36	NC	-- / 15(5)	0.05	--	50	--	--	0.087
		Antimony	7440-36-0	818	NC	454	NC	905	NC	124	NC	17	NC	31	NC	409	NC	5.0	0.30	--	--	0.015	NC	-- / 0.5	0.006	0.14	0.14	--	0.030	--
		Arsenic	7440-38-2	13	C	4.2	C	36	C	35	C	0.79	C	0.39	C	1.6	C	29	1.0	0.0004	C	0.00004	C	-- / 0.01	0.01	5.7	5.7	0.97	--	0.15
		Barium	7440-39-3	>100,000	NC	>100,000	NC	>100,000	NC	61,939	NC	8,777	NC	5,375	NC	66,577	NC	1,600	82	0.52	NC	2.6	NC	-- / 0.5	2	1.0	1.0	--	0.0040	--
		Beryllium	7440-41-7	792	NC	2,156	NC	4,432	NC	380	NC	145	NC	154	NC	1,941	C	63	3.0	0.0008	C	0.073	NC	-- / 0.002	0.004	1.1	1.1	--	0.00066	--
		Boron	7440-42-8	>100,000	NC	>100,000	NC	>100,000	NC	58,258	NC	15,622	NC	16,000	NC	100,000	MAX	--	--	21	NC	7.3	NC	--	--	--	0.50	--	0.0016	--
		Cadmium	7440-43-9	2,044	NC	1,128	NC	2,249	NC	309	NC	19	NC	37	NC	451	NC	8.0	0.40	0.0011	C	0.018	NC	-- / 0.2	0.005	0.0022	0.0022	0.00035	--	0.00025
		Calcium	7440-70-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Chromium	7440-47-3	448	C	498	C	17,234	C	287	C	211	C	100,000	MAX	100,000	MAX	--	--	--	--	55	NC	-- / 0.5	0.1	0.40	0.40	--	--	0.074
		Cobalt	7440-48-4	957	NC	2,135	C	37,303	NC	846	NC	903	C	903	C	1,921	C	--	--	0.0007	C	0.73	NC	-- / 0.1	--	0.14	0.14	6,034	0.023	--
		Copper	7440-50-8	75,628	NC	42,016	NC	83,731	NC	11,459	NC	2,894	NC	3,129	NC	40,877	NC	--	--	--	--	1.5	NC	-- / 1	1.3	5.4	5.4	0.0097	--	0.009
		Iron	7439-89-6	>100,000	NC	>100,000	NC	>100,000	NC	92,909	NC	23,464	NC	23,463	NC	100,000	MAX	--	--	--	--	11	NC	--	0.3	--	200	--	--	1.0
		Lead	7439-92-1	NE	--	NE	--	NE	--	NE	--	NE	--	400	NC	800	NC	--	--	--	--	--	--	-- / 0.05	0.015	0.054	0.029	0.000065	--	0.0025
		Lithium	1313-13-9	40,880	NC	22,711	NC	45,260	NC	6,194	NC	1,564	NC	1,564	NC	20,439	NC	--	--	--	--	0.73	NC	--	--	--	--	--	--	--
		Magnesium	7439-95-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Manganese	7439-96-5	2,387	NC	63,093	NC	>100,000	NC	2,281	NC	7,935	NC	1,762	NC	19,458	NC	--	--	0.051	NC	0.88	NC	-- / (C)5	0.05	--	100	60,836	0.12	--
		Molybdenum	7439-98-7	10,220	NC	5,678	NC	11,315	NC	1,548	NC	391	NC	391	NC	5,110	NC	--	--	--	--	0.18	NC	-- / 15	--	--	2.0	--	0.37	--
		Nickel	7440-02-0	40,880	NC	22,711	NC	45,260	NC	6,194	NC	1,260	NC	1,564	NC	20,439	NC	130	7.0	--	--	0.73	NC	-- / 1	--	14	1.0	0.40	--	0.052

TABLE 2
PRELIMINARY PROJECT SCREENING LEVELS
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Parameter of Interest	Analytical Method	Compound List	CAS Number	Preliminary Risk-Based Screening Levels (RBSLs)[1]										USEPA Region 9 PRGs[2]										OSHA PELs[5] (ppm / mg/m^3)	MCL (mg/L)[4]	Preliminary Ecological Screening Levels (ESLs)[3]				National AWQC (mg/L)[4]
				Commercial Worker RBSL (mg/kg)[4]	Basis	Maintenance Worker RBSL (mg/kg)[4]	Basis	Trespasser/ Recreational User RBSL (mg/kg)[4]	Basis	Construction Worker RBSL (mg/kg)[4]	Basis	Residential RBSL (mg/kg)[4]	Basis	Residential PRG (mg/kg)[4]	Basis	Industrial PRG (mg/kg)[4]	Basis	SSL (DAF = 20) (mg/kg)[4]	SSL (DAF = 1) (mg/kg)[4]	Ambient Air PRG (µg/m^3)[4]	Basis	Tap Water PRG (mg/L)[4]	Basis			USEPA Region 5 ESL (mg/kg)[4]	Terrestrial ESL (mg/kg)[4]	Aquatic ESL (mg/L)[4]	Tier II SCV (mg/L)[4]	
Metals (Continued)	**EPA 6020/6010B**	Niobium	7440-03-1	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Palladium	7440-05-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Phosphorus	7723-14-0	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 0.1	0.025[11]	--	--	--	--	--
		Platinum	7440-06-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 0.002	--	--	--	--	--	--
		Potassium	7440-09-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Selenium	7782-49-2	10,220	NC	5,678	NC	11,315	NC	1,548	NC	256	NC	391	NC	5,110	NC	5.0	0.30	--	--	0.18	NC	-- / 0.2	0.05	0.028	0.028	0.0037	--	0.005
		Silicon	7440-21-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 15(5)	--	--	--	--	--	--
		Silver	7440-22-4	10,220	NC	5,678	NC	11,315	NC	1,548	NC	87	NC	391	NC	5,110	NC	34.0	2.0	--	--	0.18	NC	-- / 0.01	0.1	4.0	2.0	--	0.00036	--
		Sodium	7440-23-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Strontium	7440-24-6	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	46,929	NC	46,924	NC	100,000	MAX	--	--	--	--	22	NC	--	--	--	--	--	1.5	--
		Sulfur	7704-34-9	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Thallium	7440-28-0	135	NC	75	NC	149	NC	20	NC	5.1	NC	5.2	NC	67	NC	--	--	--	--	0.0024	NC	-- / 0.1	0.002	0.057	0.057	2,214	0.012	--
		Tin	7440-31-5	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	46,929	NC	46,924	NC	100,000	MAX	--	--	--	--	22	NC	-- / 2	--	7.6	7.6	--	0.073	--
		Titanium	7440-32-6	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	100,000	MAX	100,000	MAX	--	--	31	NC	146	NC	--	--	--	1,000	--	--	--
		Tungsten	7440-33-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	400	--	--	--
		Uranium	7440-61-1	409	NC	227	NC	453	NC	62	NC	16	NC	16	NC	204	NC	--	--	--	--	0.0073	NC	-- / 0.05(0.25)	0.03	--	5.0	--	0.0026	--
		Vanadium	7440-62-2	2,044	NC	1,136	NC	2,263	NC	310	NC	78	NC	78	NC	1,022	NC	6,000	300	--	--	0.036	NC	-- / (C)0.5	--	1.6	1.6	--	0.020	--
		Zinc	7440-66-6	>100,000	NC	>100,000	NC	>100,000	NC	92,909	NC	10,614	NC	23,463	NC	100,000	MAX	12,000	620	--	--	11	NC	-- / 15(5)	0.5	6.6	0.073	0.055	--	0.12
		Zirconium	7440-67-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 5	--	--	--	--	--	--
	EPA 7196A/7199	Chromium (VI)	18540-29-9	65	C	72	C	2,496	C	42	C	31	C	30	C	64	C	38	2.0	0.00002	C	0.11	NC	--	--	--	81	--	--	0.011
	EPA 7470/7471A	Mercury	7439-97-6	613	NC	341	NC	679	NC	93	NC	23	NC	23	NC	307	NC	--	--	--	--	0.011	NC	0.1 / --	0.002	0.10	0.00046	0.000028	--	0.00077
Organophosphorous Pesticides	**EPA 8141A**	Azinphos-ethyl	264-27-19	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Azinphos-methyl	86-50-0	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 0.2	--	--	--	--	--	0.00001
		Carbophenothion	786-19-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Chlorpyrifos	2921-88-2	6,060	NC	3,406	NC	6,789	NC	927	NC	235	NC	183	NC	1,847	NC	--	--	11	NC	0.11	NC	--	--	--	--	--	--	0.000041
		Coumaphos	56-72-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Demeton-O	298-03-3	81	NC	45	NC	91	NC	12	NC	3.1	NC	2.4	NC	25	NC	--	--	0.15	NC	0.0015	NC	-- / 0.1	--	--	--	--	--	0.0001
		Demeton-S	126-75-0	81	NC	45	NC	91	NC	12	NC	3.1	NC	2.4	NC	25	NC	--	--	0.15	NC	0.0015	NC	-- / 0.1	--	--	--	--	--	0.0001
		Diazinon	333-41-5	1,818	NC	1,022	NC	2,037	NC	278	NC	70	NC	55	NC	554	NC	--	--	3.3	NC	0.033	NC	--	--	--	--	--	0.000043	--
		Dichlorvos	62-73-7	20	C	11	C	91	C	75	C	2.2	C	1.7	C	5.9	C	--	--	0.023	C	0.00023	C	-- / 1	--	--	--	--	--	--
		Dimethoate	60-51-5	404	NC	227	NC	453	NC	62	NC	16	NC	12	NC	123	NC	--	--	0.73	NC	0.0073	NC	--	--	0.22	0.22	--	--	--
		Disulfoton	298-04-4	81	NC	45	NC	91	NC	12	NC	3.1	NC	2.4	NC	25	NC	--	--	0.15	NC	0.0015	NC	--	--	0.020	0.020	--	--	--
		EPN	2104-64-5	20	NC	11	NC	23	NC	3.1	NC	0.78	NC	0.61	NC	6.2	NC	--	--	0.037	NC	0.00036	NC	-- / 0.5	--	--	--	--	--	--
		Ethoprop	13194-48-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Ethyl parathion	56-38-2	12,120	NC	6,812	NC	13,577	NC	1,855	NC	469	NC	367	NC	3,694	NC	--	--	22	NC	0.22	NC	-- / 0.1	--	--	--	--	--	0.000013
		Fampphur	52-85-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	0.050	0.050	--	--	--
		Fenthion	55-38-9	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Malathion	121-75-5	40,400	NC	22,708	NC	45,257	NC	6,183	NC	1,564	NC	1,222	NC	12,312	NC	--	--	73	NC	0.73	NC	-- / 15	--	--	--	--	--	0.0001
		Methyl carbophenothion	953-17-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Methyl parathion	298-00-0	505	NC	284	NC	566	NC	77	NC	20	NC	15	NC	154	NC	--	--	0.91	NC	0.0091	NC	--	--	0.00029	0.00029	--	--	0.000013
		Mevinphos	7786-34-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 0.1	--	--	--	--	--	--
		Naled	300-76-5	4,040	NC	2,271	NC	4,526	NC	618	NC	156	NC	122	NC	1,231	NC	--	--	7.3	NC	0.073	NC	-- / 3	--	--	--	--	--	--
		O,O,O-Triethyl phosphorothioate (TEPP)	297-97-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 0.05	--	--	--	--	--	--
		Phorate	298-02-2	404	NC	227	NC	453	NC	62	NC	16	NC	12	NC	123	NC	--	--	0.73	NC	0.0073	NC	--	--	0.00050	0.00050	--	--	--
		Phosmet	732-11-6	40,400	NC	22,708	NC	45,257	NC	6,183	NC	1,564	NC	1,222	NC	12,312	NC	--	--	73	NC	0.73	NC	--	--	--	--	--	--	--
		Ronnel	299-84-3	>100,000	NC	56,769	NC	>100,000	NC	15,457	NC	3,911	NC	3,055	NC	30,780	NC	--	--	183	NC	1.8	NC	-- / 15	--	--	--	--	--	--
		Stirophos (Tetrachlorovinphos)	22248-79-9	238	C	132	C	1,100	C	902	C	27	C	20	C	72	C	--	--	0.28	C	0.0028	--	--	--	--	--	--	--	--
		Sulfotep	3689-24-5	1,010	NC	568	NC	1,131	NC	155	NC	39	NC	31	NC	308	NC	--	--	1.8	NC	0.018	NC	-- / 0.2	--	--	--	--	--	--
Chlorinated Herbicides	**EPA 8151A**	2,4,5-T	93-76-5	20,200	NC	11,354	NC	22,629	NC	3,091	NC	782	NC	611	NC	6,156	NC	--	--	37	NC	0.36	NC	-- / 10	0.05	0.60	0.60	--	--	--
		2,4,5-TP (Silvex)	93-72-1	16,160	NC	9,083	NC	18,103	NC	2,473	NC	626	NC	489	NC	4,925	NC	--	--	29	NC	0.29	NC	--	0.05	0.11	0.11	--	--	--
		2,4-D	94-75-7	20,200	NC	8,537	NC	17,143	NC	2,689	NC	686	NC	686	NC	7,683	NC	--	--	37	NC	0.36	NC	-- / 10	0.07	0.027	0.027	--	--	--
		2,4-DB	94-82-6	16,160	NC	6,830	NC	13,715	NC	2,151	NC	549	NC	489	NC	4,925	NC	--	--	29	NC	0.29	NC	--	--	--	--	--	--	--
		Dalapon	75-99-0	60,600	NC	34,061	NC	67,886	NC	9,274	NC	2,346	NC	1,833	NC	18,468	NC	--	--	110	NC	1.1	NC	--	0.2	--	--	--	--	--
		Dicamba	1918-00-9	60,600	NC	34,061	NC	67,886	NC	9,274	NC	2,346	NC	1,833	NC	18,468	NC	--	--	110	NC	1.1	NC	--	--	--	--	--	--	--
		Dichloroprop	120-36-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Dinoseb	88-85-7	2,020	NC	1,135	NC	2,263	NC	309	NC	78	NC	61	NC	616	NC	--	--	3.7	NC	0.036	NC	--	0.007	0.022	0.022	--	--	--
		MCPA	94-74-6	1,010	NC	568	NC	1,131	NC	155	NC	39	NC	31	NC	308	NC	--	--	1.8	NC	0.018	NC	--	--	--	--	--	--	--
		MCPP	93-65-2	2,020	NC	1,135	NC	2,263	NC	309	NC	78	NC	61	NC	616	NC	--	--	3.7	NC	0.036	NC	--	--	--	--	--	--	--
Organic Acids	**HPLC**	4-Chlorobenzene sulfonic acid	98-66-8	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Benzenesulfonic acid	98-11-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		O,O-Diethylphosphorodithioic acid	298-06-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		O,O-Dimethylphosphorodithioic acid	756-80-9	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 2
PRELIMINARY PROJECT SCREENING LEVELS
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Parameter of Interest	Analytical Method	Compound List	CAS Number	Preliminary Risk-Based Screening Levels (RBSLs)[1]										USEPA Region 9 PRGs[2]										OSHA PELs[5] (ppm / mg/m^3)	MCL (mg/L)[4]	Preliminary Ecological Screening Levels (ESLs)[3]				National AWQC (mg/L)[4]
				Commercial Worker RBSL (mg/kg)[4]	Basis	Maintenance Worker RBSL (mg/kg)[4]	Basis	Trespasser/ Recreational User RBSL (mg/kg)[4]	Basis	Construction Worker RBSL (mg/kg)[4]	Basis	Residential RBSL (mg/kg)[4]	Basis	Residential PRG (mg/kg)[4]	Basis	Industrial PRG (mg/kg)[4]	Basis	SSL (DAF = 20) (mg/kg)[4]	SSL (DAF = 1) (mg/kg)[4]	Ambient Air PRG (µg/m^3)[4]	Basis	Tap Water PRG (mg/L)[4]	Basis			USEPA Region 5 ESL (mg/kg)[4]	Terrestrial ESL (mg/kg)[4]	Aquatic ESL (mg/L)[4]	Tier II SCV (mg/L)[4]	
Nonhalogenated Organics	**EPA 8015B**	Ethylene glycol	107-21-1	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	100,000	MAX	100,000	MAX	--	--	7,300	NC	73	NC	--	--	--	--	--	--	--
		Ethylene glycol monobutyl ether	111-76-2	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	39,107	NC	30,552	NC	100,000	MAX	--	--	13,505	NC	18	NC	50 / 240	--	--	--	--	--	--
		Methanol	67-56-1	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	39,106	NC	30,552	NC	100,000	MAX	--	--	1,825	NC	18	NC	200 / 260	--	--	--	--	--	--
		Propylene glycol	57-55-6	>100,000	NC	>100,000	NC	>100,000	NC	75,644	NC	38,262	NC	30,034	NC	100,000	MAX	--	--	3.1	NC	18	NC	--	--	--	--	--	--	--
Organochlorine Pesticides	**EPA 8081A**	2,4-DDD	53-19-0	24	C	11	C	92	C	83	C	2.4	C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,4-DDE	3424-82-6	17	C	7.8	C	65	C	58	C	1.7	C	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3	0.0057	--	--
		4,4-DDD	72-54-8	24	C	11	C	92	C	83	C	2.4	C	2.4	C	10	C	16	0.8	0.028	C	0.00028	C	--	--	0.76	0.76	0.0057	0.000011	--
		4,4-DDE	72-55-9	17	C	7.8	C	65	C	58	C	1.7	C	1.7	C	7.0	C	54	3.0	0.020	C	0.00020	C	--	--	0.59	0.59	0.0057	--	--
		4,4-DDT	50-29-3	17	C	7.8	C	65	C	58	C	1.7	C	1.7	C	7.0	C	32	2.0	0.020	C	0.00020	C	-- / 1	--	0.0035	0.0035	0.0057	--	0.000001
		Aldrin	309-00-2	0.34	C	0.19	C	1.6	C	1.3	C	0.038	C	0.029	C	0.10	C	0.5	0.02	0.0004	C	0.000004	C	-- / 0.25	--	3.3	1.1	1.1	--	--
		alpha-BHC	319-84-6	0.91	C	0.40	C	3.3	C	3.1	C	0.090	C	0.090	C	0.36	C	0.0005	0.00003	0.0011	C	0.00001	C	--	--	0.099	0.10	--	0.0022	--
		alpha-Chlordane	5103-71-9	16	C	7.2	C	60	C	55	C	1.6	C	1.6	C	6.5	C	10	0.5	0.019	C	0.00019	C	-- / 0.5	0.002	0.22	0.22	--	--	0.0000043
		beta-BHC	319-85-7	3.2	C	1.4	C	12	C	11	C	0.32	C	0.32	C	1.3	C	0.003	0.0001	0.0037	C	0.00004	C	--	--	0.0040	0.0040	--	0.0022	--
		Chlordane	57-74-9	16	C	7.2	C	60	C	55	C	1.6	C	1.6	C	6.5	C	10	0.5	0.019	C	0.00019	C	-- / 0.5	0.002	0.22	0.22	--	--	0.0000043
		delta-BHC	319-86-8	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	9.9	9.9	--	0.0022	--
		Dieldrin	60-57-1	0.36	C	0.20	C	1.7	C	1.4	C	0.040	C	0.030	C	0.11	C	0.004	0.0002	0.0004	C	0.000004	C	-- / 0.25	--	0.0024	0.000032	--	--	0.000056
		Endosulfan I	959-98-8	12,120	NC	6,812	NC	13,577	NC	1,855	NC	469	NC	367	NC	3,694	NC	18	0.9	22	NC	0.22	NC	--	--	0.12	0.12	--	--	0.000056
		Endosulfan II	33213-65-9	12,120	NC	6,812	NC	13,577	NC	1,855	NC	469	NC	367	NC	3,694	NC	18	0.9	22	NC	0.22	NC	--	--	0.12	0.12	--	--	0.000056
		Endosulfan sulfate	1031-07-8	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	0.036	0.036	--	--	--
		Endrin	72-20-8	606	NC	341	NC	679	NC	93	NC	23	NC	18	NC	185	NC	1.0	0.05	1.1	NC	0.011	NC	-- / 0.1	0.002	0.010	0.010	--	--	0.000036
		Endrin aldehyde	7421-93-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	0.011	0.011	--	--	--
		Endrin ketone	53494-70-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		gamma-BHC (Lindane)	58-89-9	4.4	C	1.9	C	16	C	15	C	0.44	C	0.44	C	1.7	C	0.009	0.0005	0.0052	C	0.00005	C	-- / 0.5	0.0002	0.0050	0.0050	244,791	0.0022	--
		gamma-Chlordane	5103-74-2	16	C	7.2	C	60	C	55	C	1.6	C	1.6	C	6.5	C	10	0.5	0.019	C	0.00019	C	-- / 0.5	0.002	0.22	0.22	--	--	0.0000043
		Heptachlor	76-44-8	1.3	C	0.71	C	5.9	C	4.8	C	0.14	C	0.11	C	0.38	C	23	1.0	0.0015	C	0.00001	C	-- / 0.5	0.0004	0.0060	0.0060	615,231	--	0.0000038
		Heptachlor epoxide	1024-57-3	0.63	C	0.35	C	2.9	C	2.4	C	0.070	C	0.053	C	0.19	C	0.7	0.03	0.0007	C	0.00001	C	--	0.0002	0.15	0.15	--	--	0.0000038
		Methoxychlor	72-43-5	10,100	NC	5,677	NC	11,314	NC	1,546	NC	391	NC	306	NC	3,078	NC	160	8.0	18	NC	0.18	NC	-- / 15	0.04	0.020	0.020	--	0.000019	0.00003
		Toxaphene	8001-35-2	5.2	C	2.9	C	24	C	20	C	0.58	C	0.44	C	1.6	C	31	2.0	0.0060	C	0.00006	C	-- / 0.5	0.003	0.12	0.12	--	--	0.0000002
Polychlorinated Biphenyls	**EPA 8082**	Aroclor 1016	12674-11-2	82	C	24	C	84	NC	15	NC	3.9	NC	3.9	NC	21	C	--	--	0.10	C	0.0010	C	--	0.0005	0.00033	0.00033	0.086	--	0.000014
		Aroclor 1221	11104-28-2	2.9	C	0.83	C	7.0	C	4.4	NC	0.22	C	0.22	C	0.74	C	--	--	0.0034	C	0.00003	C	--	0.0005	0.00033	0.00033	0.086	--	0.000014
		Aroclor 1232	11141-16-5	2.9	C	0.83	C	7.0	C	4.4	NC	0.22	C	0.22	C	0.74	C	--	--	0.0034	C	0.00003	C	--	0.0005	0.00033	0.00033	0.086	--	0.000014
		Aroclor 1242	53469-21-9	2.9	C	0.83	C	7.0	C	4.4	NC	0.22	C	0.22	C	0.74	C	--	--	0.0034	C	0.00003	C	-- / 1	0.0005	0.00033	0.00033	0.0085	--	0.000014
		Aroclor 1248	12672-29-6	2.9	C	0.83	C	7.0	C	4.4	NC	0.22	C	0.22	C	0.74	C	--	--	0.0034	C	0.00003	C	--	0.0005	0.00033	0.00033	0.0085	--	0.000014
		Aroclor 1254	11097-69-1	2.9	C	0.83	C	7.0	C	4.4	NC	0.22	C	0.22	C	0.74	C	--	--	0.0034	C	0.00003	C	-- / 0.5	0.0005	0.00033	0.00033	0.0085	--	0.000014
		Aroclor 1260	11096-82-5	2.9	C	0.83	C	7.0	C	4.4	NC	0.22	C	0.22	C	0.74	C	--	--	0.0034	C	0.00003	C	--	0.0005	0.00033	0.00033	0.0085	--	0.000014
		PCB-77 (see 2,3,7,8-TCDD TEQ)	32598-13-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-81 (see 2,3,7,8-TCDD TEQ)	70362-50-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-105 (see 2,3,7,8-TCDD TEQ)	32598-14-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-114 (see 2,3,7,8-TCDD TEQ)	74472-37-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-118 (see 2,3,7,8-TCDD TEQ)	31508-00-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-123 (see 2,3,7,8-TCDD TEQ)	65510-44-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-126 (see 2,3,7,8-TCDD TEQ)	57465-28-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-156 (see 2,3,7,8-TCDD TEQ)	38380-08-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-157 (see 2,3,7,8-TCDD TEQ)	69782-90-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-167 (see 2,3,7,8-TCDD TEQ)	52663-72-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-169 (see 2,3,7,8-TCDD TEQ)	32774-16-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		PCB-189 (see 2,3,7,8-TCDD TEQ)	39635-31-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polynuclear Aromatic Hydrocarbons	**EPA 8310**	Acenaphthene	83-32-9	>100,000	NC	36,667	NC	74,113	NC	13,351	NC	3,440	NC	3,682	NC	29,219	NC	570	29	219	NC	0.37	NC	-- / 0.2[5]	--	682	20	--	--	--
		Acenaphthylene	208-96-8	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 0.2[5]	--	682	682	--	--	--
		Anthracene	120-12-7	>100,000	NC	>100,000	NC	>100,000	NC	62,913	NC	16,345	NC	21,896	NC	100,000	MAX	12,000	590	1,095	NC	1.8	NC	-- / 0.2[5]	--	1,480	1,480	--	0.00073	--
		Benzo(a)anthracene	56-55-3	7.8	C	2.3	C	20	C	21	C	0.62	C	0.62	C	2.1	C	2.0	0.08	0.0092	C	0.00009	C	-- / 0.2[5]	--	5.2	5.2	--	0.000027	--
		Benzo(a)pyrene	50-32-8	0.78	C	0.23	C	2.0	C	2.1	C	0.062	C	0.062	C	0.21	C	8.0	0.4	0.0009	C	0.00001	C	-- / 0.2[5]	0.0002	1.5	1.5	>100,000	0.000014	--
		Benzo(b)fluoranthene	205-99-2	7.8	C	2.3	C	20	C	21	C	0.62	C	0.62	C	2.1	C	5.0	0.2	0.0092	C	0.00009	C	-- / 0.2[5]	--	60	60	--	--	--
		Benzo(g,h,i)perylene	191-24-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	-- / 0.2[5]	--	119	119	--	--	--
		Benzo(k)fluoranthene	207-08-9	78	C	23	C	197	C	214	C	6.2	C	6.2	C	21	C	49	2.0	0.092	C	0.00092	C	-- / 0.2[5]	--	148	148	--	--	--
		Chrysene	218-01-9	738	C	231	C	1,966	C	2,122	C	61	C	62	C	211	C	160	8.0	0.92	C	0.0092	C	-- / 0.2[5]	--	4.7	4.7	--	--	--
		Dibenzo(a,h)anthracene	53-70-3	0.78	C	0.23	C	2.0	C	2.1	C	0.062	C	0.062	C	0.21	C	2.0	0.08	0.0009	C	0.00001	C	-- / 0.2[5]	--	18	18	--	--	--
		Indeno(1,2,3-cd)pyrene	193-39-5	7.8	C	2.3	C	20	C	21	C	0.62	C	0.62	C	2.1	C	14	0.7	0.0092	C	0.00009	C	-- / 0.2[5]	--	109	109	--	--	--
		Phenanthrene	85-01-8	60,600	NC	18,334	NC	37,057	NC	6,675	NC	1,720	NC	--	--	--	--	--	--	--	--	--	--	-- / 0.2[5]	--	46	46	--	--	--
		Pyrene	129-00-0	55,480	NC	17,830	NC	36,637	NC	6,608	NC	1,704	NC	2,316	NC	29,126	NC	4,200	210	110	NC	0.18	NC	-- / 0.2[5]	--	79	79	--	--	--

TABLE 2
PRELIMINARY PROJECT SCREENING LEVELS
(Page 4 of 7)

Parameter of Interest	Analytical Method	Compound List	CAS Number	Preliminary Risk-Based Screening Levels (RBSLs)[1]										USEPA Region 9 PRGs[2]										OSHA PELs[5] (ppm / mg/m^3)	MCL (mg/L)[4]	Preliminary Ecological Screening Levels (ESLs)[3]				National AWQC (mg/L)[4]
				Commercial Worker RBSL (mg/kg)[4]	Basis	Maintenance Worker RBSL (mg/kg)[4]	Basis	Trespasser/ Recreational User RBSL (mg/kg)[4]	Basis	Construction Worker RBSL (mg/kg)[4]	Basis	Residential RBSL (mg/kg)[4]	Basis	Residential PRG (mg/kg)[4]	Basis	Industrial PRG (mg/kg)[4]	Basis	SSL (DAF = 20) (mg/kg)[4]	SSL (DAF = 1) (mg/kg)[4]	Ambient Air PRG (µg/m^3)[4]	Basis	Tap Water PRG (mg/L)[4]	Basis			USEPA Region 5 ESL (mg/kg)[4]	Terrestrial ESL (mg/kg)[4]	Aquatic ESL (mg/L)[4]	Tier II SCV (mg/L)[4]	
Radionuclides	EPA 900.0 or EPA 9320	Gross alpha	G_Alpha	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--		15[6]	--	--	--	--	--
		Gross beta	G_Beta	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--		--[7]	--	--	--	--	--
	EPA 901.1/ HASL GA-01-R	Actinium-228	14331-83-0	2,660	C	1,182	C	10,636	C	1,064	C	731	C	732	C	1,190	C	--	--	--	--	24	C		--	--	--	--	--	--
		Bismuth-212	14913-49-6	82,445	C	36,640	C	>100,000	C	32,964	C	22,647	C	22,600	C	37,000	C	--	--	--	--	67	C		--	--	--	--	--	--
		Bismuth-214	14733-03-0	29,772	C	13,232	C	>100,000	C	11,909	C	8,181	C	8,190	C	13,400	C	--	--	--	--	248	C		--	--	--	--	--	--
		Cobalt-57	13981-50-5	32	C	14	C	128	C	21	C	8.8	C	8.7	C	14	C	168	8.4	--	--	46	C		--	--	--	--	--	--
		Cobalt-60	10198-40-0	0.13	C	0.060	C	0.95	C	0.42	C	0.036	C	0.036	C	0.060	C	2.4	0.12	--	--	3.0	C		--	--	692	3,760	--	--
		Lead-210	14255-04-0	166	C	1.2	C	14	C	5.8	C	0.45	C	0.15	C	1.2	C	0.011	0.0006	--	--	0.038	C		--	--	--	--	--	--
		Lead-211	015816-77-0	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	>100,000	--	--	116	C		--	--			--	--
		Lead-212	15092-94-1	13,689	C	6,065	C	53,058	C	5,405	C	3,693	C	3,640	C	6,130	C	>100,000	>100,000	--	--	1.9	C		--	--	--	--	--	--
		Lead-214	15067-28-4	>100,000	C	74,838	C	>100,000	C	67,343	C	46,264	C	46,300	C	75,600	C	>100,000	>100,000	--	--	138	C		--	--	--	--	--	--
		Potassium-40	13966-00-2	0.61	C	0.27	C	10	C	6.1	C	0.14	C	0.11	C	0.27	C	--	--	--	--	1.9	C		--	--	--	--	--	--
		Thallium-208	14913-50-9	82,018	C	36,452	C	>100,000	C	32,807	C	22,537	C	22,600	C	36,800	C	--	--	--	--	--	C		--	--	--	--	--	--
		Thorium-227	15623-47-9	435	C	192	C	1,600	C	139.0	C	113.8	C	113	C	194	C	66,800	3,340	--	--	1.0	C		--	--			--	--
		Thorium-234	15065-10-8	7,834	C	3,251	C	15,667	C	2,529	C	1,365	C	1,330	C	3,280	C	82,600	4,130	--	--	2.1	C		--	--	--	--	--	--
	HASL A-01-R	Thorium-232	7440-29-1	1,423	C	20	C	143	C	34	C	3.4	C	3.1	C	19	C	6.1	0.30	--	--	0.47	C		--	--	1,510	304	--	--
		Thorium-228	14274-82-9	0.57	C	0.25	C	2.5	C	0.71	C	0.15	C	0.15	C	0.26	C	66	3.3	--	--	0.16	C		--	--	--	--	--	--
		Thorium-230	14269-63-7	594	C	21	C	162	C	47	C	3.8	C	3.5	C	20	C	6.1	0.30	--	--	0.52	C		--	--	--	--	--	--
		Uranium-233/234	13966-29-5	496	C	29	C	203	C	96	C	4.7	C	4.0	C	32	C	2,240	112	--	--	0.67	C	1.25 rem/qtr	--	--	4,830	200	--	--
		Uranium 235/236	15117-96-1	0.90	C	0.39	C	14	C	8.3	C	0.20	C	0.20	C	0.40	C	0.78	0.039	--	--	0.66	C		--	--	2,770	217	--	--
		Uranium-238	7440-61-1	4.3	C	1.8	C	49	C	30	C	0.78	C	0.74	C	1.8	C	0.12	0.006	--	--	0.55	C		--	--	1,580	223	--	--
	EPA 903.0 / 903.1	Radium-226	13982-63-3	0.058	C	0.026	C	0.94	C	0.56	C	0.013	C	0.012	C	0.026	C	0.32	0.016	--	--	0.00082	C		5[10]	--	51	4.1	--	--
	EPA 904.0	Radium-228	15262-20-1	0.34	C	0.15	C	2.2	C	1.1	C	0.085	C	0.068	C	0.15	C	1.2	0.059	--	--	0.046	C		5[10]	--	44	3.4	--	--
	Quantitate from Parent or Daughter Radionuclide	Actinium-227 (from Th-227)	14952-40-0	0.48	C	0.21	C	5.1	C	2.3	C	0.11	C	0.10	C	0.21	C	--	--	--	--	0.10	C		--	--			--	--
		Bismuth-210 (from Pb-210)	14331-79-4	>100,000	C	84,868	C	>100,000	C	48,637	C	26,177	C	4,800	C	85,500	C	--	--	--	--	0.86	C		--	--	--	--	--	--
		Bismuth-211 (from Pb-211)	15229-37-5	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	--	--	--	--	--	C		--	--			--	--
		Polonium-210 (from Pb-210)	13981-52-7	>100,000	C	274	C	460	C	73	C	55	C	38	C	273	C	--	--	--	--	0.13	C		--	--	--	--	--	--
		Polonium-212 (from Bi-212)	13981-52-7	NE	C	NE	C	NE	C	NE	C	NE	C	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--
		Polonium-214 (from Bi-214)	15735-67-8	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	--	--	--	--	--	--		--	--	--	--	--	--
		Polonium-216 (from Pb-212)	15756-58-8	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	--	--	--	--	--	--		--	--	--	--	--	--
		Polonium-218 (from Pb-214)	15422-74-9	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	--	--	--	--	--	--		--	--	--	--	--	--
		Protactinium-231 (from U-235)	14331-85-2	3.5	C	1.4	C	35	C	15	C	0.58	C	0.46	C	1.4	C	--	--	--	--	0.28	C		--	--	--	--	--	--
		Protactinium-234 (from Th-234)	15100-28-4	1,266	C	563	C	5,062	C	506	C	348	C	348	C	568	C	--	--	--	--	19	C		--	--	--	--	--	--
		Radium-223 (from Th-227)	15623-45-7	622	C	267	C	1,828	C	198	C	141	C	90	C	270	C	5,670	284	--	--	0.20	C		--	--	--	--	--	--
		Radium-224 (from Pb-212)	13233-32-4	22,603	C	7,863	C	22,888	C	3,504	C	2,280	C	741	C	7,910	C	78,400	3,920	--	--	0.0010	C		--	--	--	--	--	--
		Thallium-207 (from Pb-211)	14133-67-6	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	--	--	--	--	--	C		--	--			--	--
		Thorium-231 (from U-235)	14932-40-2	>100,000	C	52,306	C	>100,000	C	46,584	C	31,342	C	31,300	C	52,800.0	C	>100,000	>100,000	--	--	22	C		--	--			--	--
Radon	FLUX/EPA AC	Radon-220	22481-48-7	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	--	--	--	--	--	C	4 pCi/L	--	--	--	--	--	--
		Radon-222	14859-67-7	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	>100,000	C	2,380	119	--	--	1.3	C	(EPA)	--	--	--	--	--	--
Aldehydes	EPA 8315A	Acetaldehyde	75-07-0	23	C	26	C	894	C	164	NC	11	C	11	C	23	C	--	--	0.87	C	0.0017	C	200 / 360	--	--	--	--	--	--
		Chloroacetaldehyde	107-20-0	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	(C)1 / (C)3	--	--	--	--	--	--
		Dichloroacetaldehyde	79-02-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Formaldehyde	50-00-0	>100,000	NC	>100,000	NC	>100,000	NC	61,939	NC	15,643	NC	9,166	NC	100,000	NC	--	--	0.15	C	5.5	NC	0.75 / --	--	--	--	--	--	--
		Trichloroacetaldehyde	75-87-6	>100,000	NC	>100,000	NC	>100,000	NC	30,970	NC	7,821	NC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds	EPA 8270C	1,2,4,5-Tetrachlorobenzene	95-94-3	606	NC	205	NC	414	NC	71	NC	18	NC	18	NC	185	NC	--	--	1.1	NC	0.011	NC	--	--	--	2.0	2.0	--	--
		1,2-Diphenylhydrazine	122-66-7	7	C	2	C	20	C	21	C	0.61	--	0.61	C	2.2	C	--	--	0.0084	C	0.00008	C	--	--	--	--	--	--	--
		1,4-Dioxane	123-91-1	520	C	174	C	1,463	C	1,514	C	44	C	44	C	157	C	--	--	0.61	C	0.0061	C	100 / 360	--	--	--	--	--	--
		2,2′/4,4'-Dichlorobenzil (see 4,4'-Dichlorobenzil)	3457-46-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,4,5-Trichlorophenol	95-95-4	>100,000	NC	68,401	NC	>100,000	NC	23,790	NC	6,110	NC	6,110	NC	61,561	NC	270	14	365	NC	3.6	NC	--	--	--	14	4.0	--	--
		2,4,6-Trichlorophenol	88-06-2	202	NC	68	NC	138	NC	24	NC	6.1	NC	6.1	NC	62	NC	0.2	0.008	0.37	NC	0.0036	NC	--	--	--	9.9	9.9	--	--
		2,4-Dichlorophenol	120-83-2	6,060	NC	2,052	NC	4,139	NC	714	NC	183	NC	183	NC	1,847	NC	1.0	0.05	11	NC	0.11	NC	--	--	--	88	88	--	--
		2,4-Dimethylphenol	105-67-9	40,400	NC	13,680	NC	27,597	NC	4,758	NC	1,222	NC	1,222	NC	12,312	NC	9.0	0.4	73	NC	0.73	NC	--	--	--	0.010	0.010	--	--
		2,4-Dinitrophenol	51-28-5	4,040	NC	1,368	NC	2,760	NC	476	NC	122	NC	122	NC	1,231	NC	0.3	0.01	7.3	NC	0.073	NC	--	--	--	0.061	0.061	--	--
		2,4-Dinitrotoluene	121-14-2	8.4	C	2.8	C	24	C	25	C	0.71	C	0.72	C	2.5	C	0.0008	0.00004	0.0099	C	0.00010	C	-- / 1.5	--	--	1.3	1.3	--	--
		2,6-Dinitrotoluene	606-20-2	8.4	C	2.8	C	24	C	25	C	0.71	C	0.72	C	2.5	C	0.0007	0.00003	0.0099	C	0.00010	C	-- / 1.5	--	--	0.033	0.033	--	--
		2-Chloronaphthalene	91-58-7	27,285	NC	21,856	NC	68,612	NC	12,047	NC	3,286	NC	4,937	NC	23,383	NC	--	--	292	NC	0.49	NC	--	--	--	0.012	0.012	--	--
		2-Chlorophenol	95-57-8	241	NC	254	NC	1,142	NC	205	NC	61	NC	63	NC	236	NC	4.0	0.2	18	NC	0.030	NC	--	--	--	0.24	0.24	--	--
		2-Methylnaphthalene	91-57-6	8,176	NC	2,736	NC	5,520	NC	953	NC	244	NC	--	--	--	--	--	--	--	--	--	--	--	--	--	3.2	3.2	--	--
		2-Nitroaniline	88-74-4	2,802	NC	2,034	NC	4,124	NC	628	NC	183	NC	183	NC	1,830	NC	--	--	0.11	NC	0.11	NC	--	--	--	74	74	--	--
		2-Nitrophenol	88-75-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6	1.6	--	--
		3,3-Dichlorobenzidine	91-94-1	13	C	4	C	36	C	37	C	1.1	C	1.1	C	3.8	C	0.007	0.0003	0.015	C	0.00015	C	--	--	--	0.65	0.65	--	--
		3-Nitroaniline	99-09-2	272	C	91	C	414	NC	71	NC	18	NC	18	NC	82	C	--	--	0.32	C	0.0032	C	--	--	--	3.2	3.2	--	--
		4,4'-Dichlorobenzil	3457-46-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		4-Bromophenyl phenyl ether	101-55-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0015	--

TABLE 2
PRELIMINARY PROJECT SCREENING LEVELS
(Page 5 of 7)

Parameter of Interest	Analytical Method	Compound List	CAS Number	Preliminary Risk-Based Screening Levels (RBSLs)[1]										USEPA Region 9 PRGs[2]										OSHA PELs[5] (ppm / mg/m^3)	MCL (mg/L)[4]	Preliminary Ecological Screening Levels (ESLs)[3]				National AWQC (mg/L)[4]
				Commercial Worker RBSL (mg/kg)[4]	Basis	Maintenance Worker RBSL (mg/kg)[4]	Basis	Trespasser/ Recreational User RBSL (mg/kg)[4]	Basis	Construction Worker RBSL (mg/kg)[4]	Basis	Residential RBSL (mg/kg)[4]	Basis	Residential PRG (mg/kg)[4]	Basis	Industrial PRG (mg/kg)[4]	Basis	SSL (DAF = 20) (mg/kg)[4]	SSL (DAF = 1) (mg/kg)[4]	Ambient Air PRG (µg/m^3)[4]	Basis	Tap Water PRG (mg/L)[4]	Basis			USEPA Region 5 ESL (mg/kg)[4]	Terrestrial ESL (mg/kg)[4]	Aquatic ESL (mg/L)[4]	Tier II SCV (mg/L)[4]	
Semivolatile Organic Compounds (Continued)	EPA 8270C	4-Chloro-3-methylphenol	59-50-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		4-Chlorophenyl phenyl ether	7005-72-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		4-Chlorothioanisole	123-09-1	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		4-Chlorothiophenol	106-54-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		4-Nitroaniline	100-01-6	272	C	91	C	767	C	712	NC	23	C	23	C	82	C	--	--	0.32	C	0.0032	C	1 / 6	--	22	22	--	--	--
		4-Nitrophenol	100-02-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	5.1	5.1	--	0.30	--
		Acenaphthene (see Method 8310)	83-32-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Acenaphthylene (see Method 8310)	208-96-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Acetophenone	98-86-2	>100,000	NC	68,407	NC	>100,000	NC	23,823	NC	6,110	NC	--	--	--	--	--	--	--	--	--	--	--	--	300	300	--	--	--
		Aniline	62-53-3	1,004	C	336	C	2,824	C	1,613	NC	85	C	85	C	302	C	--	--	1.0	NC	0.012	C	5 / 19	--	0.057	0.057	--	--	--
		Anthracene (see Method 8310)	120-12-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Azobenzene	103-33-3	52	C	17	C	146	C	151	C	4.4	C	4.4	C	16	C	--	--	0.062	C	0.00061	C	--	--	--	--	--	--	--
		Benzo(a)anthracene (see Method 8310)	56-55-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Benzo(a)pyrene (see Method 8310)	50-32-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Benzo(b)fluoranthene (see Method 8310)	205-99-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Benzo(g,h,i)perylene (see Method 8310)	191-24-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Benzo(k)fluoranthene (see Method 8310)	207-08-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Benzoic acid	65-85-0	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	100,000	MAX	100,000	MAX	400	20	14,600	NC	146	NC	--	--	--	--	--	0.042	--
		Benzyl alcohol	100-51-6	>100,000	NC	>100,000	NC	>100,000	NC	71,370	NC	18,331	NC	18,331	NC	100,000	MAX	--	--	1,095	NC	11	NC	--	--	66	66	--	0.0086	--
		bis(2-Chloroethoxy)methane	111-91-1	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	0.30	0.30	--	--	--
		bis(2-Chloroethyl) ether	111-44-4	0.6	C	0.5	C	9	C	8	C	0.19	C	0.22	C	0.58	C	0.0004	0.00002	0.0061	C	0.00001	C	(C)15 / (C)90	--	--	--	--	--	--
		bis(2-Chloroisopropyl) ether	108-60-1	82	C	27	C	230	C	238	C	6.9	C	2.9	C	7.4	C	--	--	0.19	C	0.00027	C	--	--	20	20	--	--	--
		bis(2-Ethylhexyl) phthalate	117-81-7	409	C	137	C	1,150	C	1,189	C	35	C	35	C	123	C	--	--	0.48	C	0.0048	C	-- / 5	0.006	0.93	0.93	--	0.0030	--
		bis(Chloromethyl) ether	542-88-1	0.026	C	0.0087	C	0.073	C	0.076	C	0.0022	C	0.0002	C	0.0004	C	--	--	0.00003	C	5.2 E-8	C	--	--	24	24	--	--	--
		bis(p-Chlorophenyl) sulfone	80-07-9	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		bis(p-Chlorophenyl)disulfide	1142-19-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Butyl benzyl phthalate	85-68-7	>100,000	NC	>100,000	NC	>100,000	NC	47,580	NC	12,221	NC	12,221	NC	100,000	MAX	930	810	730	NC	7.3	NC	--	--	239	239	--	0.019	--
		Carbazole	86-74-8	286	C	96	C	805	C	833	C	24	C	24	C	86	C	0.6	0.0	0.34	C	0.0034	C	--	--	--	--	--	--	--
		Chrysene (see Method 8310)	218-01-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Dibenzo(a,h)anthracene (see Method 8310)	53-70-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Dibenzofuran	132-64-9	5,063	NC	2,309	NC	5,134	NC	889	NC	231	NC	145	NC	1,563	NC	--	--	7.3	NC	0.012	NC	--	--	--	--	--	0.0037	--
		Dichloromethyl ether	542-88-1	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Diethyl phthalate	84-66-2	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	48,882	NC	48,882	NC	100,000	MAX	--	--	2,920	NC	29	NC	--	--	25	25	--	0.21	--
		Dimethyl phthalate	131-11-3	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	100,000	MAX	100,000	MAX	--	--	36,500	NC	365	NC	-- / 5	--	734	200	--	--	--
		Di-n-butyl phthalate	84-74-2	>100,000	NC	68,401	NC	>100,000	NC	23,790	NC	6,110	NC	6,110	NC	61,561	NC	2,300	270	365	NC	3.6	NC	-- / 5	--	0.15	0.15	--	0.035	--
		Di-n-octyl phthalate	117-84-0	80,800	NC	27,360	NC	55,193	NC	9,516	NC	2,444	NC	2,444	NC	24,624	NC	10,000	10,000	146	NC	1.5	NC	--	--	--	200	--	--	--
		Diphenyl disulfide	882-33-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Diphenyl sulfide	139-66-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Diphenyl sulfone	127-63-9	NE	--	NE	--	NE	--	NE	--	NE	--	183.3	NC	1,846.8	NC	--	--	11.0	NC	0.1	NC	--	--	--	--	--	--	--
		Fluoranthene	206-44-0	80,800	NC	24,445	NC	49,409	NC	8,901	NC	2,294	NC	2,294	NC	22,000	NC	4,300	210	146	NC	1.5	NC	--	--	122	122	--	--	--
		Fluorene	86-73-7	38,733	NC	18,821	NC	44,066	NC	7,950	NC	2,082	NC	2,747	NC	26,281	NC	560	28	146	NC	0.24	NC	--	--	122	30	--	0.0039	--
		Hexachlorobenzene	118-74-1	3.6	C	1.2	C	10	C	10	C	0.30	C	0.30	C	1.1	C	2.0	0.1	0.0042	C	0.00004	C	--	0.001	0.20	0.20	--	--	--
		Hexachlorobutadiene	87-68-3	73	C	25	C	206	C	71	NC	6.2	C	6.2	C	22	C	2.0	0.1	0.086	C	0.00086	C	--	--	0.040	0.040	--	--	--
		Hexachlorocyclopentadiene	77-47-4	5,448	NC	4,065	NC	8,247	NC	1,247	NC	365	NC	365	NC	3,659	NC	400	20	0.21	NC	0.22	NC	--	0.05	0.76	0.76	--	--	--
		Hexachloroethane	67-72-1	409	C	137	C	1,150	C	238	NC	35	C	35	C	123	C	0.5	0.02	0.48	C	0.0048	C	1 / 10	--	0.60	0.60	--	0.012	--
		Hydroxymethyl phthalimide	118-29-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Indeno(1,2,3-cd)pyrene (see Method 8310)	193-39-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Isophorone	78-59-1	6,023	C	2,016	C	16,945	C	17,529	C	511	C	512	C	512	C	0.5	0.03	7.1	C	0.071	C	25 / 140	--	139	139	--	--	--
		m,p-Cresol	106-44-5	10,100	NC	3,420	NC	6,899	NC	1,189	NC	306	NC	306	NC	3,078	NC	--	--	18	NC	0.18	NC	5 / 22	--	163	163	--	--	--
		Naphthalene	91-20-3	189	NC	207	NC	1,006	NC	182	NC	55	NC	56	NC	188	NC	84	4.0	3.1	NC	0.0062	NC	10 / 50	--	0.099	0.10	>100,000	0.012	--
		Nitrobenzene	98-95-3	114	NC	101	NC	351	NC	62	NC	17	NC	20	NC	103	NC	0.1	0.007	2.1	NC	0.0034	NC	1 / 5	--	1.3	1.3	--	--	--
		N-nitrosodi-n-propylamine	621-64-7	0.8	C	0.27	C	2.3	C	2.4	C	0.069	C	0.069	C	0.25	C	0.00005	0.000002	0.0010	C	0.00001	C	--	--	0.54	0.54	--	--	--
		N-nitrosodiphenylamine	86-30-6	1,168	C	391	C	3,285	C	3,399	C	99	C	99	C	352	C	1.0	0.06	1.4	C	0.014	C	--	--	0.55	0.55	--	0.21	--
		o-Cresol	95-48-7	>100,000	NC	34,200	NC	68,991	NC	11,895	NC	3,055	NC	3,055	NC	30,780	NC	15	0.8	183	NC	1.8	NC	5 / 22	--	--	--	--	0.013	--
		Octachlorostyrene	29082-74-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		p-Chloroaniline (4-Chloroaniline)	106-47-8	8,080	NC	2,736	NC	5,519	NC	952	NC	244	NC	244	NC	2,462	NC	0.70	0.03	15	NC	0.15	NC	--	--	1.1	1.1	--	--	--
		p-Chlorobenzenethiol (see 4-Chlorothiophenol)	106-54-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Pentachlorobenzene	608-93-5	1,616	NC	547	NC	1,104	NC	190	NC	49	NC	49	NC	492	NC	--	--	2.9	NC	0.029	NC	--	--	0.50	0.50	--	0.00047	--
		Pentachlorophenol	87-86-5	48	C	10	C	85	C	103	C	3	C	3.0	C	9.0	C	0.03	0.001	0.056	C	0.00056	C	-- / 0.5	0.001	0.12	0.0018	--	--	0.015
		Phenanthrene (see Method 8310)	85-01-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Phenol	108-95-2	>100,000	NC	>100,000	NC	>100,000	NC	71,370	NC	18,331	NC	18,331	NC	100,000	MAX	100	5.0	1,095	NC	11	NC	5 / 19	--	120	30	--	--	--

TABLE 2
PRELIMINARY PROJECT SCREENING LEVELS
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Parameter of Interest	Analytical Method	Compound List	CAS Number	Preliminary Risk-Based Screening Levels (RBSLs)[1]										USEPA Region 9 PRGs[2]										OSHA PELs[5] (ppm / mg/m^3)	MCL (mg/L)[4]	Preliminary Ecological Screening Levels (ESLs)[3]				National AWQC (mg/L)[4]
				Commercial Worker RBSL (mg/kg)[4]	Basis	Maintenance Worker RBSL (mg/kg)[4]	Basis	Trespasser/ Recreational User RBSL (mg/kg)[4]	Basis	Construction Worker RBSL (mg/kg)[4]	Basis	Residential RBSL (mg/kg)[4]	Basis	Residential PRG (mg/kg)[4]	Basis	Industrial PRG (mg/kg)[4]	Basis	SSL (DAF = 20) (mg/kg)[4]	SSL (DAF = 1) (mg/kg)[4]	Ambient Air PRG (µg/m^3)[4]	Basis	Tap Water PRG (mg/L)[4]	Basis			USEPA Region 5 ESL (mg/kg)[4]	Terrestrial ESL (mg/kg)[4]	Aquatic ESL (mg/L)[4]	Tier II SCV (mg/L)[4]	
Semivolatile Organic Compounds (Continued)	EPA 8270C	Phthalic acid	88-99-3	>100,000	NC	>100,000	NC	>100,000	NC	>100,000	NC	78,211	NC	61,103	NC	100,000	MAX	--	--	3,650	NC	36.5	NC	--	--	--	--	--	--	--
		Pyrene (see Method 8310)	129-00-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Pyridine	110-86-1	2,020	NC	684	NC	1,380	NC	238	NC	61	NC	61	NC	616	NC	--	--	3.7	NC	0.036	NC	5 / 15	--	1.0	1.0	--	--	--
		Thiophenol	108-98-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Tentatively Identified Compounds (TICs)		NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds	EPA 8260B	1,1,1,2-Tetrachloroethane	630-20-6	7.5	C	8.1	C	231	C	158	C	3.2	C	3.2	C	7.3	C	--	--	0.26	C	0.00043	C	--	--	225	225	--	--	--
		1,1,1-Trichloroethane	71-55-6	7,033	NC	7,719	NC	37,108	NC	6,580	NC	1,982	NC	1,200	SAT	1,200	SAT	2.0	0.1	2,300	NC	3.2	NC	350 / 1900	0.2	30	30	--	0.011	--
		1,1,2,2-Tetrachloroethane	79-34-5	0.96	C	1.0	C	30	C	20	C	0.41	C	0.41	C	0.93	C	0.003	0.0002	0.033	C	0.00006	C	5 / 35	--	0.13	0.13	--	0.61	--
		1,1,2-Trichloroethane	79-00-5	1.6	C	1.8	C	56	C	37	C	0.73	C	0.73	C	1.6	C	0.02	0.0009	0.12	C	0.00020	C	10 / 45	0.005	0.012	0.012	--	1.2	--
		1,1-Dichloroethane	75-34-3	1,754	NC	1,932	NC	9,385	NC	1,673	NC	506	NC	506	NC	1,739	NC	23	1.0	521	NC	0.81	NC	100 / 400	--	20	20	--	0.047	--
		1,1-Dichloroethene	75-35-4	415	NC	459	NC	2,261	NC	406	NC	124	NC	124	NC	413	NC	0.06	0.003	208	NC	0.34	NC	--	0.007	8.3	8.3	--	0.025	--
		1,1-Dichloropropene	563-58-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,2,3-Trichlorobenzene	87-61-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	--	--	--
		1,2,3-Trichloropropane	96-18-4	0.077	C	0.083	C	2.5	C	1.7	C	0.033	C	0.034	C	0.08	C	--	--	0.0034	C	0.00001	C	50 / 300	--	3.4	3.4	--	--	--
		1,2,4-Trichlorobenzene	120-82-1	7,785	NC	4,592	NC	11,516	NC	2,003	NC	527	NC	62	NC	216	NC	5.0	0.3	3.7	NC	0.0072	NC	--	0.07	11	11	--	0.11	--
		1,2,4-Trimethylbenzene	95-63-6	171	NC	189	NC	938	NC	169	NC	52	NC	52	NC	170	NC	--	--	6.2	NC	0.012	NC	--	--	--	--	--	--	--
		1,2-Dichlorobenzene	95-50-1	4,177	NC	4,538	NC	21,197	NC	3,706	NC	1,103	NC	600	SAT	600	SAT	17	0.9	209	NC	0.37	NC	(C)50 / (C)300	0.6	3.0	3.0	--	0.014	--
		1,2-Dichloroethane	107-06-2	0.61	C	0.67	C	22	C	14	C	0.28	C	0.28	C	0.60	C	0.02	0.001	0.074	C	0.00012	C	50 / --	0.005	21	21	--	0.91	--
		1,2-Dichloroethene (see cis-, trans-)	540-59-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	200 / 790	--	--	--	--	--	--
		1,2-Dichloropropane	78-87-5	0.75	C	0.82	C	27	C	18	C	0.34	C	0.34	C	0.74	C	0.03	0.001	0.10	C	0.00016	C	75 / 350	0.005	33	33	--	--	--
		1,3,5-Trichlorobenzene	108-70-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,3,5-Trimethylbenzene	108-67-8	70	NC	77	NC	385	NC	69	NC	21	NC	21	NC	70	NC	--	--	6.2	NC	0.012	NC	--	--	--	--	--	--	--
		1,3-Dichlorobenzene	541-73-1	65	NC	70	NC	315	NC	54	NC	16	NC	531	NC	600	SAT	--	--	110	NC	0.18	NC	--	--	38	38	--	0.071	--
		1,3-Dichloropropene (see cis-, trans-)	542-75-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		1,3-Dichloropropane	142-28-9	364	NC	401	NC	1,944	NC	346	NC	105	NC	105	NC	361	NC	--	--	73	NC	0.12	NC	--	--	--	--	--	--	--
		1,4-Dichlorobenzene	106-46-7	8.1	C	8.7	C	250	C	171	C	3.4	C	3.4	C	7.9	C	2.0	0.1	0.31	C	0.00050	C	75 / 450	0.075	0.55	0.55	--	0.015	--
		2,2-Dichloropropane	594-20-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,2-Dimethylpentane	590-35-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,2,3-Trimethylbutane	464-06-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,3-Dimethylpentane	565-59-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2,4-Dimethylpentane	108-08-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2-Chlorotoluene	95-49-8	568	NC	622	NC	2,978	NC	527	NC	158	NC	158	NC	560	NC	--	--	73	NC	0.12	NC	--	--	--	--	--	--	--
		2-Hexanone	591-78-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	100 / 410	--	13	13	--	0.099	--
		2-Methylhexane	591-76-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2-Nitropropane	79-46-9	152	C	169	C	5,851	C	1,359	NC	72	C	--	--	--	--	--	--	0.00072	C	0.0000012	C	25 / 90	--	--	--	--	--	--
		3,3-Dimethylpentane	562-49-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3-Ethylpentane	617-78-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3-Methylhexane	589-34-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		4-Chlorobenzene (see Chlorobenzene)	108-90-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	75 / 350	--	--	--	--	--	--
		4-Chlorotoluene	106-43-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		4-Methyl-2-pentanone (MIBK)	108-10-1	>100,000	NC	90,843	NC	>100,000	NC	24,772	NC	6,257	NC	5,281	NC	47,001	NC	--	--	3,139	NC	2.0	NC	100 / 410	--	443	443	--	0.17	--
		Acetone	67-64-1	55,977	NC	60,360	NC	>100,000	NC	47,827	NC	14,127	NC	14,127	NC	54,321	NC	16	0.8	3,285	NC	5.5	NC	1000 / 2400	--	2.5	2.5	--	1.5	--
		Acetonitrile	75-05-8	2,047	NC	2,275	NC	11,332	NC	2,047	NC	627	NC	424	NC	1,818	NC	--	--	62	NC	0.10	NC	40 / 70	--	1.4	1.4	--	--	--
		Benzene	71-43-2	1.4	C	1.6	C	50	C	33	C	0.64	C	0.64	C	1.4	C	0.03	0.002	0.25	C	0.00035	C	10 / --	0.005	0.26	0.26	--	0.13	--
		Bromobenzene	108-86-1	94	NC	104	NC	514	NC	92	NC	28	NC	28	NC	92	NC	--	--	10	NC	0.020	NC	--	--	--	--	--	--	--
		Bromodichloromethane	75-27-4	1.9	C	2.0	C	63	C	42	C	0.82	C	0.82	C	1.8	C	0.6	0.03	0.11	C	0.00018	C	--	0.08[9]	0.54	0.54	--	--	--
		Bromoform	75-25-2	724	C	402	C	3,342	C	2,742	C	81	C	62	C	218	C	0.8	0.04	1.7	C	0.0085	C	0.5 / 5	0.08[9]	16	16	--	0.32	--
		Bromomethane	74-83-9	13	NC	15	NC	71	NC	13	NC	3.9	NC	3.9	NC	13	NC	0.2	0.01	5.2	NC	0.0087	NC	(C)20 / (C)80	--	0.24	0.24	--	--	--
		Carbon disulfide	75-15-0	1,209	NC	1,335	NC	6,537	NC	1,170	NC	355	NC	355	NC	720	SAT	32	2.0	730	NC	1.0	NC	20 / --	--	0.094	0.094	--	0.00092	--
		Carbon tetrachloride	56-23-5	0.56	C	0.61	C	20	C	7.2	NC	0.25	C	0.25	C	0.55	C	0.07	0.003	0.13	C	0.00017	C	10 / --	0.005	3.0	3.0	--	0.0098	--
		Chlorobenzene	108-90-7	537	NC	589	NC	2,826	NC	501	NC	151	NC	151	NC	530	NC	1.0	0.07	62	NC	0.11	NC	75 / 350	0.1	13	13	--	0.064	--
		Chlorobromomethane	74-97-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	200 / 1050	--	--	--	--	--	--
		Chlorodibromomethane (see Dibromochloromethane)	124-48-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Chloroethane	75-00-3	6.5	C	7.2	C	244	C	160	C	3.0	C	3.0	C	6.5	C	--	--	2.3	C	0.0046	C	1000 / 2600	--	--	--	--	--	--
		Chloroform	67-66-3	0.47	C	0.53	C	18	C	12	NC	0.22	C	0.22	C	0.47	C	0.6	0.03	0.083	C	0.00017	C	(C)50 / (C)240	0.08[9]	1.2	1.2	--	0.028	--
		Chloromethane	74-87-3	156	NC	173	NC	855	NC	154	NC	47	NC	47	NC	156	NC	--	--	95	NC	0.16	NC	100 / --	--	10	10	--	--	--
		cis-1,2-Dichloroethene	156-59-2	147	NC	163	NC	793	NC	142	NC	43	NC	43	NC	146	NC	0.4	0.02	37	NC	0.061	NC	--	0.07	--	--	--	0.59	--
		cis-1,3-Dichloropropene	10061-01-5	1.8	C	2.0	C	57	C	39	C	0.78	C	0.78	C	1.8	C	0.004	0.0002	0.5	C	0.0004	C	--	--	0.40	0.40	--	0.000055	--
		Cymene (Isopropyltoluene)	99-87-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Dibromochloroethane	73506-94-2	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Dibromochloromethane	124-48-1	3	C	3	C	79	C	54	C	1.1	C	1.1	C	2.6	C	0.4	0.02	0.080	C	0.00013	C	--	0.08[9]	2.1	2.1	--	--	--
		Dibromochloropropane	96-12-8	12	NC	12	NC	47	NC	8	NC	2.1	NC	0.46	C	2.0	C	--	--	0.21	NC	0.00005	C	0.001 / --	0.0002	--	--	--	--	--
		Dibromomethane	74-95-3	236	NC	260	NC	1,250	NC	222	NC	67	NC	67	NC	234	NC	--	--	37	NC	0.061	NC	--	--	--	--	--	--	--
		Dichloromethane (Methylene chloride)	75-09-2	21	C	23	C	674	C	457	C	9	C	9.1	C	20.5	C	0.02	0.001	4.1	C	0.0043	C	25 / --	0.005	4.1	4.1	--	2.2	--

TABLE 2
PRELIMINARY PROJECT SCREENING LEVELS
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Parameter of Interest	Analytical Method	Compound List	CAS Number	Preliminary Risk-Based Screening Levels (RBSLs)[1]										USEPA Region 9 PRGs[2]										OSHA PELs[5] (ppm / mg/m^3)	MCL (mg/L)[4]	Preliminary Ecological Screening Levels (ESLs)[3]				National AWQC (mg/L)[4]
				Commercial Worker RBSL (mg/kg)[4]	Basis	Maintenance Worker RBSL (mg/kg)[4]	Basis	Trespasser/ Recreational User RBSL (mg/kg)[4]	Basis	Construction Worker RBSL (mg/kg)[4]	Basis	Residential RBSL (mg/kg)[4]	Basis	Residential PRG (mg/kg)[4]	Basis	Industrial PRG (mg/kg)[4]	Basis	SSL (DAF = 20) (mg/kg)[4]	SSL (DAF = 1) (mg/kg)[4]	Ambient Air PRG (µg/m^3)[4]	Basis	Tap Water PRG (mg/L)[4]	Basis			USEPA Region 5 ESL (mg/kg)[4]	Terrestrial ESL (mg/kg)[4]	Aquatic ESL (mg/L)[4]	Tier II SCV (mg/L)[4]	
Volatile Organic Compounds (Continued)	**EPA 8260B**	Dimethyldisulfide	624-92-0	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Ethanol	64-17-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	1000 / 1900	--	--	--	--	--	--
		Ethylbenzene	100-41-4	20	C	22	C	693	C	460	C	8.9	C	395	SAT	395	SAT	13	0.7	1,059	NC	1.3	NC	100 / 435	0.7	5.2	5.2	--	0.0073	--
		Freon-11 (Trichlorofluoromethane)	75-69-4	1,279	NC	1,418	NC	7,020	NC	1,264	NC	386	NC	386	NC	2,000	SAT	--	--	730	NC	1.3	NC	1000 / 5600	--	16	16	--	--	--
		Freon-113 (1,1,2-Trifluoro-1,2,2-trichloroethane)	76-13-1	69,072	NC	76,661	NC	>100,000	NC	68,639	NC	20,979	NC	5,600	SAT	5,600	SAT	--	--	31,281	NC	59	NC	1000 / 7600	--	--	--	--	--	--
		Freon-12 (Dichlorodifluoromethane)	75-71-8	308	NC	341	NC	1,697	NC	306	NC	94	NC	94	NC	308	NC	--	--	209	NC	0.39	NC	1000 / 4950	--	40	40	--	--	--
		Heptane	142-82-5	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	500 / 2000	--	--	--	--	--	--
		Isoheptane	31394-54-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Isopropylbenzene	98-82-8	1,997	NC	2,197	NC	10,638	NC	1,893	NC	572	NC	572	NC	1,977	NC	--	--	402	NC	0.66	NC	50 / 245	--	--	--	--	--	--
		m,p-Xylene (see Xylenes (total))	mp-XYL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Methyl ethyl ketone (2-Butanone)	78-93-3	>100,000	NC	>100,000	NC	>100,000	NC	79,499	NC	22,312	NC	22,311	NC	113,264	NC	--	--	5,110	NC	7.0	NC	200 / 590	--	90	90	--	14	--
		Methyl iodide	74-88-4	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	5 / 28	--	1.2	1.2	--	--	--
		MTBE (Methyl tert-butyl ether)	1634-04-4	37	C	40	C	1,306	C	865	C	17	C	17	C	36	C	--	--	3.7	C	0.006	C	--	--	--	--	--	--	--
		n-Butylbenzene	104-51-8	2,255	NC	2,438	NC	11,243	NC	1,953	NC	579	NC	240	SAT	240	SAT	--	--	146	NC	0.24	NC	--	--	--	--	--	--	--
		n-Propylbenzene	103-65-1	2,255	NC	2,438	NC	11,243	NC	1,953	NC	579	NC	240	SAT	240	SAT	--	--	146	NC	0.24	NC	--	--	--	--	--	--	--
		Nonanal	124-19-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		o-Xylene (see Xylenes (total))	95-47-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		sec-Butylbenzene	135-98-8	81,434	NC	45,332	NC	90,448	NC	12,380	NC	3,127	NC	220	SAT	220	SAT	--	--	146	NC	243	NC	--	--	--	--	--	--	--
		Styrene	100-42-5	18,963	NC	20,136	NC	88,545	NC	15,053	NC	4,382	NC	1,700	SAT	1,700	SAT	4.0	0.2	1,059	NC	1.6	NC	100 / --	0.1	4.7	4.7	--	--	--
		tert-Butylbenzene	98-06-6	80,800	NC	45,415	NC	90,514	NC	12,366	NC	3,128	NC	390	SAT	390	SAT	--	--	146	NC	0.24	NC	--	--	--	--	--	--	--
		Tetrachloroethene	127-18-4	3.5	C	3.8	C	110	C	75	C	1.5	C	0.48	C	1.3	C	0.06	0.003	0.32	C	0.00010	C	100 / --	0.005	9.9	9.9	--	0.098	--
		Toluene	108-88-3	2,225	NC	2,458	NC	12,052	NC	2,159	NC	656	NC	520	SAT	520	SAT	12	0.6	402	NC	0.72	NC	200 / --	1	5.5	5.5	--	0.0098	--
		trans-1,2-Dichloroethene	156-60-5	236	NC	261	NC	1,278	NC	229	NC	69	NC	69	NC	235	NC	0.7	0.03	73	NC	0.12	NC	--	0.1	--	--	--	0.59	--
		trans-1,3-Dichloropropene	10061-02-6	1.8	C	2.0	C	57	C	39	C	0.78	C	0.78	C	1.8	C	0.004	0.0002	0.5	C	0.0004	C	--	--	0.40	0.40	--	0.000055	--
		Trichloroethene	79-01-6	7.7	C	8.4	C	266	C	95	NC	3.4	C	0.053	C	0.11	C	0.1	0.003	0.017	C	0.00003	C	100 / --	0.005	12	12	--	0.047	--
		Vinyl acetate	108-05-4	1,397	NC	1,552	NC	7,714	NC	1,392	NC	426	NC	426	NC	1,396	NC	170	8.0	209	NC	0.41	NC	--	--	13	13	--	0.016	--
		Vinyl chloride	75-01-4	0.43	C	0.43	C	9.0	C	6.5	C	0.15	C	0.079	C	0.75	C	0.01	0.0007	0.11	C	0.00002	C	1 / --	0.002	0.65	0.65	--	--	--
		Xylenes (total)	1330-20-7	902	NC	1,000	NC	4,950	NC	891	NC	272	NC	271	NC	420	SAT	210	10	106	NC	0.21	NC	100 / 435	10	10	10	--	0.013	--
		Tentatively Identified Compounds (TICs)		NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Water Quality Parameters	**EPA 120.1**	Conductivity	COND	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EPA 130.2	Hardness, total	Hardness	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EPA 160.1	Total dissolved solids	TDS	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	500	--	--	--	--	--
	EPA 160.2	Total suspended solids	TSS	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EPA 310.1	Alkalinity, Total (as $CACO_3$)	ALK	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20
		Bicarbonate alkalinity	71-52-3	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Carbonate alkalinity	3812-32-6	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Hydroxide alkalinity	OH-ALK	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flashpoint	**EPA 1010**	Flammables	NA	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons	**EPA 8015**	Diesel	64742-46-7	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Gasoline	8006-61-9	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Grease	68153-81-1	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Mineral Spirits	NA	NE	--	NE	--	NE	--	NE	--	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White Phosphorus	**EPA 7580M**	White phosphorus	12185-10-3	41	NC	23	NC	45	NC	6.2	NC	1.6	NC	1.6	NC	20	NC	--	--	--	--	0.00073	NC	--	--	--	--	--	--	--
Methyl Mercury	**EPA 1630**	Methyl mercury	22967-92-6	204	NC	114	NC	226	NC	31.0	NC	7.8	NC	6.1	NC	62	NC	--	--	--	--	0.0036	NC	-- / 0.01	--	--	--	--	--	--

[1]Preliminary risk-based screening levels (RBSLs) are based methods and exposure factors in Chapter 9 of the BRC Closure Plan (BRC, ERM, and MWH 2007), using the most recent toxicity criteria. RBSLs are the lower of either non-cancer (HI equals 1.0) or cancer (1 × 10-6) risks for each receptor and each compound.

[2]From USEPA Region 9 preliminary remediation goals (PRG) table, October 2004 (and August 2004 for radionuclides).

[3]Ecological screening levels (ESLs) are based methods and exposure factors presented in Chapter 10 of the BRC Closure Plan (BRC, ERM, and MWH 2007).

[4]Radionuclide units are in pCi/g (or pCi/L in water).

[5]Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) are from Tables Z-1 and Z-2 of 29 CFR 1910.1000. The values given are 8-hour time weighted averages (TWAs) in ppm and/or mg/m^3. A (C) designation denotes a ceiling limit value. PAH values are for coal tar pitch.

[6]The MCL for Alpha Particles was used as comparison to Gross Alpha results. The MCL excludes the contributions from radon and uranium. The Gross Alpha concentrations were not adjusted due to contributions from radon nor uranium prior to comparison to MCL.

[7]The MCL for Beta particles photon emitters is 4 millirems per year and was not used to compare to Gross Beta concentrations.

[8]A MCL for perchlorate has not been promulgated. The USEPA Drinking Water Equivalent Level of 24.5 ug/L was used.

[9]The constituent is regulated under the MCL for Total Trihalomethanes (TTHM). For comparison to the MCL for TTHM, concentrations of all TTHM constituents need to be considered. Chloroform was the only TTHM detected and the detection limits of all TTHM analyzed for do not sum to a concentration that would exceed the TTHM MCL.

[10]The constituent is regulated under the MCL for the combined concentration of radium-226 and radium-228. For comparison to the MCL, concentrations of both constituents are summed.

[11]A NDEP water quality standard was used for Class A (municipal or domestic supply) waters for pH and total phosphorus based on Nevada Administrative Code (NAC) 445A.118 through 445A.225.

Basis: C = carcinogenicity; NC = non-carcinogenicity; SAT = soil saturation (see USEPA Region 9 PRG Table); MAX = ceiling limit (see USEPA Region 9 PRG Table).
-- = Not applicable or no value has been established.
NE = No toxicity criteria established.
SSL = soil screening level.
DAF = dilution attenuation factor.
MCL = maximum contaminant level.
SCV = secondary chronic value (from Suter and Tsao. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. June).
AWQC = ambient water quality criteria (freshwater chronic criteria from USEPA. 2004. National Recommended Water Quality Criteria. Office of Water, Office of Science and Technology, Washington, DC).

TABLE 3
SAMPLING REQUIREMENTS
(Page 1 of 3)

Method Class	Compound	Soil		Groundwater		Air	
		Holding Time	Container/ Preservative	Holding Time	Container/ Preservative	Holding Time	Container/ Preservative
Anions	Bromide	28 days	4-oz jar or 2 x 6 sleeve	28 days	250-mL poly (unpreserved)	NA	NA
	Bromine						
	Chlorate						
	Chloride						
	Chlorite						
	Fluoride						
	Nitrate			48 hours			
	Nitrite						
	Orthophosphate						
	Sulfate			28 days			
	Sulfite	NA		24 hours			
	Perchlorate	28 days		28 days			
Dissolved Gases	Ethane	NA	NA	14 days	40-mL VOA (HCL)	NA	NA
	Ethylene						
	Methane						
Chlorinated Compounds	See Table 4	72 hrs to extraction, 14 days to analysis	4-oz jar or 2 x 6 sleeve	72 hrs to extraction, 14 days to analysis	40-mL VOA (unpreserved)	NA	NA
Dioxins/Furans	See Table 4	30 days to extraction, 45 days to analysis	4-oz jar or 2 x 6 sleeve	30 days to extraction, 45 days to analysis	1-L amber (unpreserved)	NA	NA
Asbestos	Asbestos	NA	See SOP	NA	NA	NA	NA
General Chemistry Parameters	Ammonia	28 days	4-oz jar or 2 x 6 sleeve	28 days	1-L poly (H_2SO_4)	NA	NA
	Cyanide	14 days		14 days	500 mL poly (NaOH)		
	Iodine	28 days		28 days	250-mL poly (unpreserved)		
	pH	28 days		24 hours			
	Sulfide	7 days		7 days	500 mL poly (NaOH/zinc acetate)		
	Total Inorganic Carbon	28 days		28 days	125 mL poly (H_2SO_4)		
	Total Kjeldahl Nitrogen	28 days		28 days	1-L poly (H_2SO_4)		
	Percent Moisture	7 days		NA	NA		
	Total Organic Carbon	28 days		28 days	125 mL poly (H_2SO_4)		

TABLE 3
SAMPLING REQUIREMENTS
(Page 2 of 3)

Method Class	Compound	Soil		Groundwater		Air	
		Holding Time	Container/ Preservative	Holding Time	Container/ Preservative	Holding Time	Container/ Preservative
Metals	See Table 4	180 days	4-oz jar or 2 x 6 sleeve	180 days	500-mL poly (HNO_3)	NA	NA
	Hexavalent Chromium	30 days to extraction, 4 days to analysis		24 hours	250 mL poly (unpreserved)		
	Mercury	28 days		28 days	500-mL poly (HNO_3)		
Organophosphorous Pesticides	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	1-L amber (unpreserved)	NA	NA
Chlorinated Herbicides	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	1-L amber (unpreserved)	NA	NA
Organic Acids	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction 40 days to analysis	40-mL VOA (unpreserved)	NA	NA
Gylcols/ Alcohols	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	40-mL VOA (unpreserved)	NA	NA
Organochlorine Pesticides	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	1-L amber (unpreserved)	NA	NA
Polychlorinated Biphenyls	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	1-L amber (unpreserved)	NA	NA
Polynuclear Aromatic Hydrocarbons	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	1-L amber (unpreserved)	NA	NA
Radionuclides	See Table 4	6 months	4-oz jar or 2 x 6 sleeve	6 months	4-L poly (HNO_3)	NA	NA
Aldehydes	See Table 4	72 hrs to extraction, 30 days to analysis	2 x 6 sleeve and 5-g Encores	72 hrs to extraction, 30 days to analysis	1-L amber (unpreserved)	NA	NA
Semivolatile Organic Compounds	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	1-L amber (unpreserved)	NA	NA
Volatile Organic Compounds	See Table 4	48 hours to prep Encores or 14 days to extraction/analysis	Encore VOA kit or 4-oz jar or 2 x 6 sleeve	14 days	40-mL VOAs (HCl)	30 days to analysis	6-Liter Summa
Water Quality Parameters	Conductivity	NA	NA	28 days	1-L poly (HNO_3)	NA	NA
	Hardness			6 months	1-L poly (unpreserved)		
	Total Dissolved Solids			7 days			
	Total Suspended Solids						
	Alkalinity			14 days			

TABLE 3
SAMPLING REQUIREMENTS
(Page 3 of 3)

Method Class	Compound	Soil		Groundwater		Air	
		Holding Time	Container/ Preservative	Holding Time	Container/ Preservative	Holding Time	Container/ Preservative
Flashpoint	Flammables	6 months	4-oz jar or 2 x 6 sleeve	6 months	1-L poly (unpreserved)	NA	NA
Total Petroleum Hydrocarbons	See Table 4	14 days to extraction, 40 days to analysis	4-oz jar or 2 x 6 sleeve	7 days to extraction, 40 days to analysis	1-L amber (unpreserved)	NA	NA
White Phosphorus	White Phosphorus	5 days to extraction, 6 months to analysis	4-oz jar or 2 x 6 sleeve	5 days to extraction, 6 months to analysis	1-L amber (unpreserved)	NA	NA
Methyl Mercury	Methyl Mercury	6 months to analysis	4-oz jar with Teflon lid	48 hrs to preserve, 6 months to analysis	500-mL fluoropolymer or borosilicate bottle	NA	NA

Note: A number of the methods (8270, 8081, 8082, 8151, and 8310) require addition of $Na_2S_2O_3$ if residual chlorine is present. This may be unnecessary for groundwater but is noted here for completeness.

TABLE 4
PROJECT LIST OF ANALYTES
(Page 1 of 12)

Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Ions	EPA 300.0A		EPA 300.0A		Bromide	24959-67-9	2.5	mg/kg	0.25	mg/L
					Bromine	7726-95-6	1	mg/kg	0.5	mg/L
					Chlorate	14866-68-3	5	mg/kg	0.5	mg/L
					Chloride	16887-00-6	2	mg/kg	0.2	mg/L
					Chlorine (soluble)	7782-50-5	NA	mg/kg	0.5	mg/L
					Chlorite	14998-27-7	NA	mg/kg	0.02	mg/L
					Fluoride	16984-48-8	1	mg/kg	0.1	mg/L
					Nitrate (as N)	14797-55-8	0.2	mg/kg	0.02	mg/L
					Nitrite (as N)	14797-65-0	0.2	mg/kg	0.02	mg/L
					Orthophosphate	14265-44-2	5	mg/kg	0.5	mg/L
					Sulfate	14808-79-8	5	mg/kg	0.5	mg/L
	EPA 377.1		EPA 377.1		Sulfite	14265-45-3	5	mg/kg	0.5	mg/L
	EPA 314.0		EPA 314.0		Perchlorate	14797-73-0	40	ug/kg	4	µg/L
Dissolved Gases	NA		NA	RSK 175	Ethane	74-84-0	NA	NA	5	µg/L
					Ethylene	74-85-1	NA	NA	5	µg/L
					Methane	74-82-8	NA	NA	5	µg/L
Chlorinated Compounds	EPA 551.1		EPA 551.1		Chloral	75-87-6	70	µg/kg	3	µg/L
					Dichloroacetaldehyde	79-02-7	70	µg/kg	20	µg/L
Polychlorinated Dibenzodioxins/ Dibenzofurans	EPA 8290		EPA 8290		1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0	10	pg/g	100	pg/L
					1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-9	10	pg/g	100	pg/L
					1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	5	pg/g	50	pg/L
					1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	5	pg/g	50	pg/L
					1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	5	pg/g	50	pg/L
					1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	5	pg/g	50	pg/L
					1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	5	pg/g	50	pg/L
					1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	5	pg/g	50	pg/L
					1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	5	pg/g	50	pg/L
					1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	5	pg/g	50	pg/L
					1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	5	pg/g	50	pg/L
					1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	5	pg/g	50	pg/L
					1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	5	pg/g	50	pg/L
					2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	5	pg/g	50	pg/L
					2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	5	pg/g	50	pg/L
					2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	1	pg/g	10	pg/L
					2,3,7,8-Tetrachlororodibenzo-p-dioxin	1746-01-6	1	pg/g	10	pg/L
Asbestos	Elutrator	NA	TEM	NA	Asbestos	1332-21-4	1	fibers/cm^3	NA	NA

TABLE 4
PROJECT LIST OF ANALYTES
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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
General Chemistry Parameters	EPA 350.1		EPA 350.1		Ammonia (as N)	7664-41-7	5	mg/kg	50	µg/L
	EPA 9012A		EPA 9012A		Cyanide (Total)	57-12-5	5	mg/kg	5	µg/L
	EPA 9056M	EPA 300.0A	EPA 9056M	EPA 300.0A	Iodine	7553-56-2	5	mg/kg	1	mg/L
	NA		EPA 9045C	EPA 9040B	pH in soil	pH	NA	pHunits	NA	pHunits
	EPA 160.3M	NA	EPA 160.3M	NA	Percent moisture	%MOISTURE		percent	NA	NA
	ASTM D2216-98	NA	ASTM D2216-98	NA	Percent moisture	%MOISTURE		percent	NA	NA
	EPA 376.1/376.2		EPA 376.1/376.2		Sulfide	18496-25-8	10	mg/kg	1	mg/L
	Mod. EPA 415.1		EPA 9060		Total inorganic carbon	7440-44-0	NA	mg/kg	1	mg/L
	EPA 351.2		EPA 351.2		Total Kjeldahl nitrogen (TKN)	TKN	25	mg/kg	0.1	mg/L
	EPA 9060		EPA 9060		Total organic carbon (TOC)	7440-44-0	25	mg/kg	1	mg/L
Metals	EPA 3050M	EPA 3010M	EPA 6020/6010B		Aluminum	7429-90-5	5	mg/kg	30	µg/L
					Antimony	7440-36-0	0.5	mg/kg	5	µg/L
					Arsenic	7440-38-2	1	mg/kg	10	µg/L
					Barium	7440-39-3	2	mg/kg	2	µg/L
					Beryllium	7440-41-7	0.1	mg/kg	0.5	µg/L
					Boron	7440-42-8	10	mg/kg	50	µg/L
					Cadmium	7440-43-9	0.05	mg/kg	0.5	µg/L
					Calcium	7440-70-2	50	mg/kg	100	µg/L
					Chromium	7440-47-3	1	mg/kg	10	µg/L
					Cobalt	7440-48-4	0.2	mg/kg	2	µg/L
					Copper	7440-50-8	1	mg/kg	1	µg/L
					Iron	7439-89-6	5	mg/kg	50	µg/L
					Lead	7439-92-1	0.3	mg/kg	3	µg/L
					Lithium	1313-13-9	5	mg/kg	50	µg/L
					Magnesium	7439-95-4	50	mg/kg	50	µg/L
					Manganese	7439-96-5	0	mg/kg	2	µg/L
					Molybdenum	7439-98-7	1	mg/kg	5	µg/L
					Nickel	7440-02-0	1	mg/kg	5	µg/L
					Niobium	7440-03-1	3	mg/kg	25	µg/L
					Palladium	7440-05-3	0.1	mg/kg	0.5	µg/L
					Phosphorus	7723-14-0	50	mg/kg	20	µg/L
					Platinum	7440-06-4	0.1	mg/kg	1	µg/L
					Potassium	7440-09-7	10	mg/kg	100	µg/L
					Selenium	7782-49-2	0.5	mg/kg	5	µg/L
					Silicon	7440-21-3	25	mg/kg	250	µg/L
					Silver	7440-22-4	0.2	mg/kg	2	µg/L
					Sodium	7440-23-5	20	mg/kg	50	µg/L
					Strontium	7440-24-6	0.5	mg/kg	5	µg/L
					Sulfur	7704-34-9	500	mg/kg	2000	µg/L

TABLE 4
PROJECT LIST OF ANALYTES

Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Metals (continued)	EPA 3050M	EPA 3010M	EPA 6020/6010B		Thallium	7440-28-0	0.2	mg/kg	2	µg/L
					Tin	7440-31-5	0.2	mg/kg	2	µg/L
					Titanium	7440-32-6	0.5	mg/kg	2	µg/L
					Tungsten	7440-33-7	0.5	mg/kg	5	µg/L
					Uranium	7440-61-1	0.1	mg/kg	1	µg/L
					Vanadium	7440-62-2	1.0	mg/kg	10	µg/L
					Zinc	7440-66-6	2	mg/kg	10	µg/L
					Zirconium	7440-67-7	10	mg/kg	5	µg/L
	EPA 3060A		EPA 7196A		Chromium (VI)	18540-29-9	0.4	mg/kg	10	µg/L
	EPA 7471A	EPA 7470A	EPA 7471A	EPA 7470A	Mercury	7439-97-6	0.0333	mg/kg	0.2	µg/L
Organo-phosphorous Pesticides	EPA 8141A		EPA 8141A		Azinphos-ethyl	264-27-19	33	µg/kg	0.7	µg/L
					Azinphos-methyl	86-50-0	13	µg/kg	2.5	µg/L
					Carbophenothion	786-19-6	33	µg/kg	0.6	µg/L
					Chlorpyrifos	2921-88-2	20	µg/kg	1.5	µg/L
					Coumaphos	56-72-4	13	µg/kg	1	µg/L
					Demeton-O	298-03-3	39	µg/kg	1	µg/L
					Demeton-S	126-75-0	15	µg/kg	1	µg/L
					Diazinon	333-41-5	22	µg/kg	0.5	µg/L
					Dichlorvos	62-73-7	23	µg/kg	0.5	µg/L
					Dimethoate	60-51-5	22	µg/kg	1.5	µg/L
					Disulfoton	298-04-4	48	µg/kg	0.5	µg/L
					EPN	2104-64-5	13	µg/kg	1.2	µg/L
					Ethoprop	13194-48-4	15	µg/kg	1.5	µg/L
					Ethyl parathion	56-38-2	18	µg/kg	1	µg/L
					Fampphur	52-85-7	13	µg/kg	1	µg/L
					Fenthion	55-38-9	33	µg/kg	2.5	µg/L
					Malathion	121-75-5	15	µg/kg	2	µg/L
					Methyl carbophenothion	953-17-3	33	µg/kg	0.8	µg/L
					Methyl parathion	298-00-0	20	µg/kg	4	µg/L
					Mevinphos	7786-34-7	15	µg/kg	6.2	µg/L
					Naled	300-76-5	70	µg/kg	2	µg/L
					O,O,O-Triethyl phosphorothioate (TEPP)	297-97-2	39	µg/kg	0.5	µg/L
					Phorate	298-02-2	20	µg/kg	1.2	µg/L
					Phosmet	732-11-6	67	µg/kg	1.5	µg/L
					Ronnel	299-84-3	46	µg/kg	10	µg/L
					Stirophos (Tetrachlorovinphos)	22248-79-9	15	µg/kg	3.5	µg/L
					Sulfotep	3689-24-5	20	µg/kg	1.5	µg/L

TABLE 4
PROJECT LIST OF ANALYTES
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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Chlorinated Herbicides	EPA 8151A		EPA 8151A		2,4,5-T	93-76-5	20	µg/kg	1	µg/L
					2,4,5-TP (Silvex)	93-72-1	20	µg/kg	1	µg/L
					2,4-D	94-75-7	80	µg/kg	4	µg/L
					2,4-DB	94-82-6	80	µg/kg	4	µg/L
					Dalapon	75-99-0	40	µg/kg	4	µg/L
					Dicamba	1918-00-9	40	µg/kg	2	µg/L
					Dichloroprop	120-36-5	80	µg/kg	4	µg/L
					Dinoseb	88-85-7	25	µg/kg	0.6	µg/L
					MCPA	94-74-6	8000	µg/kg	400	µg/L
					MCPP	93-65-2	8000	µg/kg	400	µg/L
Organic Acids	HPLC		HPLC		4-Chlorobenzene sulfonic acid	98-66-8	0.4	mg/Kg	0.4	mg/L
					Benzenesulfonic acid	98-11-3	0.4	mg/Kg	0.4	mg/L
					O,O-Diethylphosphorodithioic acid	298-06-6	0.4	mg/Kg	0.4	mg/L
					O,O-Dimethylphosphorodithioic acid	756-80-9	0.4	mg/Kg	0.1	mg/L
Nonhalogenated Organics	EPA 8015B		EPA 8015B		Ethylene glycol	107-21-1	50	mg/kg	10	mg/L
					Ethylene glycol monobutyl ether	111-76-2	50	mg/kg	10	mg/L
					Methanol	67-56-1	50	mg/kg	5	mg/L
					Propylene glycol	57-55-6	50	mg/kg	10	mg/L
Organochlorine Pesticides	EPA 3550B	EPA 3520C	EPA 8081A		2,4-DDD	53-19-0	1.7	µg/kg	0.05	µg/L
					2,4-DDE	3424-82-6	1.7	µg/kg	0.05	µg/L
					4,4-DDD	72-54-8	1.7	µg/kg	0.05	µg/L
					4,4-DDE	72-55-9	1.7	µg/kg	0.05	µg/L
					4,4-DDT	50-29-3	1.7	µg/kg	0.05	µg/L
					Aldrin	309-00-2	1.7	µg/kg	0.05	µg/L
					alpha-BHC	319-84-6	1.7	µg/kg	0.05	µg/L
					alpha-Chlordane	5103-71-9	1.7	µg/kg	0.05	µg/L
					beta-BHC	319-85-7	1.7	µg/kg	0.05	µg/L
					Chlordane	57-74-9	17	µg/kg	0.5	µg/L
					delta-BHC	319-86-8	1.7	µg/kg	0.05	µg/L
					Dieldrin	60-57-1	1.7	µg/kg	0.05	µg/L
					Endosulfan I	959-98-8	1.7	µg/kg	0.05	µg/L
					Endosulfan II	33213-65-9	1.7	µg/kg	0.05	µg/L
					Endosulfan sulfate	1031-07-8	1.7	µg/kg	0.05	µg/L
					Endrin	72-20-8	1.7	µg/kg	0.05	µg/L
					Endrin aldehyde	7421-93-4	1.7	µg/kg	0.05	µg/L
					Endrin ketone	53494-70-5	1.7	µg/kg	0.05	µg/L
					gamma-BHC (Lindane)	58-89-9	1.7	µg/kg	0.05	µg/L
					gamma-Chlordane	5103-74-2	1.7	µg/kg	0.05	µg/L

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PROJECT LIST OF ANALYTES
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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Organochlorine Pesticides (continued)	EPA 3550B	EPA 3510C	EPA 8081A		Heptachlor	76-44-8	1.7	µg/kg	0.05	µg/L
					Heptachlor epoxide	1024-57-3	1.7	µg/kg	0.05	µg/L
					Methoxychlor	72-43-5	3.3	µg/kg	0.1	µg/L
					Toxaphene	8001-35-2	67	µg/kg	2	µg/L
Polychlorinated Biphenyls	EPA 3510C		EPA 8082		Aroclor 1016	12674-11-2	33	µg/kg	1	µg/L
					Aroclor 1221	11104-28-2	33	µg/kg	1	µg/L
					Aroclor 1232	11141-16-5	33	µg/kg	1	µg/L
					Aroclor 1242	53469-21-9	33	µg/kg	1	µg/L
					Aroclor 1248	12672-29-6	33	µg/kg	1	µg/L
					Aroclor 1254	11097-69-1	33	µg/kg	1	µg/L
					Aroclor 1260	11096-82-5	33	µg/kg	1	µg/L
					PCB-77	32598-13-3	2	pg/g	20	pg/L
					PCB-81	70362-50-4	2	pg/g	20	pg/L
					PCB-105	32598-14-4	2	pg/g	20	pg/L
					PCB-114	74472-37-0	2	pg/g	20	pg/L
					PCB-118	31508-00-6	2	pg/g	20	pg/L
					PCB-123	65510-44-3	2	pg/g	20	pg/L
					PCB-126	57465-28-8	2	pg/g	20	pg/L
					PCB-156	38380-08-4	2	pg/g	20	pg/L
					PCB-157	69782-90-7	2	pg/g	20	pg/L
					PCB-167	52663-72-6	2	pg/g	20	pg/L
					PCB-169	32774-16-6	2	pg/g	20	pg/L
					PCB-189	39635-31-9	2	pg/g	20	pg/L
Polynuclear Aromatic Hydrocarbons	EPA 3550	EPA 3510C	EPA 8310 [1]		Acenaphthene	83-32-9	50	µg/kg	5	µg/L
					Acenaphthylene	208-96-8	100	µg/kg	5	µg/L
					Anthracene	120-12-7	30	µg/kg	5	µg/L
					Benzo(a)anthracene	56-55-3	15	µg/kg	5	µg/L
					Benzo(a)pyrene	50-32-8	15	µg/kg	5	µg/L
					Benzo(b)fluoranthene	205-99-2	15	µg/kg	5	µg/L
					Benzo(g,h,i)perylene	191-24-2	30	µg/kg	5	µg/L
					Benzo(k)fluoranthene	207-08-9	15	µg/kg	5	µg/L
					Chrysene	218-01-9	15	µg/kg	5	µg/L
					Dibenzo(a,h)anthracene	53-70-3	30	µg/kg	5	µg/L
					Indeno(1,2,3-cd)pyrene	193-39-5	15	µg/kg	5	µg/L
					Phenanthrene	85-01-8	30	µg/kg	5	µg/L
					Pyrene	129-00-0	30	µg/kg	5	µg/L

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PROJECT LIST OF ANALYTES
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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Radionuclides	NA	EPA 900.0 or 9310	NA	EPA 900.0 or 9310	Gross alpha	G Alpha	10.0	pCi/g	3.0	pCi/L
					Gross beta	G Beta	10.0	pCi/g	4.0	pCi/L
	HASL 300 RC5013/5032 [2] | RC-5016 [2] (Total Dissolution)		HASL A-01-R		Thorium-232	7440-29-1	1.0	pCi/g	1.0	pCi/L
					Thorium-228	14274-82-9	1.0	pCi/g	1.0	pCi/L
					Thorium-230	14269-63-7	1.0	pCi/g	1.0	pCi/L
	HASL 300 RC5013/5032/5086 [2] | RC-5016/5086 [2] (Total Dissolution)				Uranium-233/234	13966-29-5	1.0	pCi/g	1.0	pCi/L
					Uranium 235/236	15117-96-1	1.0	pCi/g	1.0	pCi/L
					Uranium-238	7440-61-1	1.0	pCi/g	1.0	pCi/L
	HASL 300 RC-5013/RC-5032[2]		EPA 903.1		Radium-226	13982-63-3	1.0	pCi/g	1.0	pCi/L
			EPA 904.0		Radium-228	15262-20-1	1.0	pCi/g	1.0	pCi/L
	EPA 901.1/ HASL GA-01-R		EPA 901.1/ HASL GA-01-R		Actinium-228	14331-83-0	*	pCi/g	*	pCi/L
					Bismuth-212	14913-49-6	*	pCi/g	*	pCi/L
					Bismuth-214	14733-03-0	*	pCi/g	*	pCi/L
					Cobalt-57	13981-50-5	*	pCi/g	*	pCi/L
					Cobalt-60	10198-40-0	*	pCi/g	*	pCi/L
					Lead-210	14255-04-0	*	pCi/g	*	pCi/L
					Lead-211	015816-77-0	*	pCi/g	*	pCi/L
					Lead-212	15092-94-1	*	pCi/g	*	pCi/L
					Lead-214	15067-28-4	*	pCi/g	*	pCi/L
					Potassium-40	13966-00-2	*	pCi/g	*	pCi/L
					Thallium-208	14913-50-9	*	pCi/g	*	pCi/L
					Thorium-227	15623-47-9	*	pCi/g	*	pCi/L
					Thorium-234	15065-10-8	*	pCi/g	*	pCi/L
	NA		Quantitate from Parent or Daughter Radionuclide		Actinium-227 (from Th-227)	14952-40-0	*	pCi/g	*	pCi/L
					Bismuth-210 (from Pb-210)	14331-79-4	*	pCi/g	*	pCi/L
					Bismuth-211 (from Pb-211)	15229-37-5	*	pCi/g	*	pCi/L
					Polonium-210 (from Pb-210)	13981-52-7	*	pCi/g	*	pCi/L
					Polonium-212 (from Bi-212)	13981-52-7	*	pCi/g	*	pCi/L
					Polonium-214 (from Bi-214)	15735-67-8	*	pCi/g	*	pCi/L
					Polonium-216 (from Pb-212)	15756-58-8	*	pCi/g	*	pCi/L
					Polonium-218 (from Pb-214)	15422-74-9	*	pCi/g	*	pCi/L
					Protactinium-231 (from U-235)	14331-85-2	*	pCi/g	*	pCi/L
					Protactinium-234 (from Th-234)	15100-28-4	*	pCi/g	*	pCi/L
					Radium-223 (from Th-227)	15623-45-7	*	pCi/g	*	pCi/L
					Radium-224 (from Pb-212)	13233-32-4	*	pCi/g	*	pCi/L
					Thallium-207 (from Pb-211)	14133-67-6	*	pCi/g	*	pCi/L
					Thorium-231 (from U-235)	14932-40-2	*	pCi/g	*	pCi/L

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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Radon	NA		FLUX	NA	Radon-220	22481-48-7	0.1 (Air)	pCi/L	NA	pCi/L
					Radon-222	14859-67-7	0.1 (Air)	pCi/L	NA	pCi/L
Aldehydes	EPA 8315A		EPA 8315A		Acetaldehyde	75-07-0	500	µg/kg	30	µg/L
					Chloroacetaldehyde	107-20-0	1000	µg/kg	10	µg/L
					Dichloroacetaldehyde	79-02-7	1000	µg/kg	10	µg/L
					Formaldehyde	50-00-0	1000	µg/kg	60	µg/L
					Trichloroacetaldehyde	75-87-6	1000	µg/kg	10	µg/L
Semivolatile Organic Compounds	EPA 3550B	EPA 3510C	EPA 8270C [3]		1,2,4,5-Tetrachlorobenzene	95-94-3	330	µg/kg	10	µg/L
					1,2-Diphenylhydrazine	122-66-7	330	µg/kg	10	µg/L
					1,4-Dioxane	123-91-1	330	µg/kg	10	µg/L
					2,2'/4,4'-Dichlorobenzil	3457-46-3	330	µg/kg	10	µg/L
					2,4,5-Trichlorophenol	95-95-4	330	µg/kg	10	µg/L
					2,4,6-Trichlorophenol	88-06-2	330	µg/kg	10	µg/L
					2,4-Dichlorophenol	120-83-2	330	µg/kg	10	µg/L
					2,4-Dimethylphenol	105-67-9	330	µg/kg	10	µg/L
					2,4-Dinitrophenol	51-28-5	1600	µg/kg	50	µg/L
					2,4-Dinitrotoluene	121-14-2	330	µg/kg	10	µg/L
					2,6-Dinitrotoluene	606-20-2	330	µg/kg	10	µg/L
					2-Chloronaphthalene	91-58-7	330	µg/kg	10	µg/L
					2-Chlorophenol	95-57-8	330	µg/kg	10	µg/L
					2-Methylnaphthalene	91-57-6	330	µg/kg	10	µg/L
					2-Nitroaniline	88-74-4	1600	µg/kg	50	µg/L
					2-Nitrophenol	88-75-5	330	µg/kg	10	µg/L
					3,3-Dichlorobenzidine	91-94-1	1600	µg/kg	50	µg/L
					3-Nitroaniline	99-09-2	1600	µg/kg	50	µg/L
					4,4'-Dichlorobenzil	3457-46-3	330	µg/kg	10	µg/L
					4-Bromophenyl phenyl ether	101-55-3	330	µg/kg	10	µg/L
					4-Chloro-3-methylphenol	59-50-7	330	µg/kg	10	µg/L
					4-Chlorophenyl phenyl ether	7005-72-3	330	µg/kg	10	µg/L
					4-Chlorothioanisole	123-09-1	1600	µg/kg	50	µg/L
					4-Chlorothiophenol	106-54-7	330	µg/kg	10	µg/L
					4-Nitroaniline	100-01-6	1600	µg/kg	50	µg/L
					4-Nitrophenol	100-02-7	1600	µg/kg	50	µg/L
					Acenaphthene	83-32-9	330	µg/kg	10	µg/L
					Acenaphthylene	208-96-8	330	µg/kg	10	µg/L
					Acetophenone	98-86-2	330	µg/kg	10	µg/L
					Aniline	62-53-3	330	µg/kg	10	µg/L

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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Semivolatile Organic Compounds (continued)	EPA 3550B	EPA 3510C	EPA 8270C [3]		Anthracene	120-12-7	330	µg/kg	10	µg/L
					Azobenzene	103-33-3	330	µg/kg	10	µg/L
					Benzo(a)anthracene	56-55-3	330	µg/kg	10	µg/L
					Benzo(a)pyrene	50-32-8	330	µg/kg	10	µg/L
					Benzo(b)fluoranthene	205-99-2	330	µg/kg	10	µg/L
					Benzo(g,h,i)perylene	191-24-2	330	µg/kg	10	µg/L
					Benzo(k)fluoranthene	207-08-9	330	µg/kg	10	µg/L
					Benzoic acid	65-85-0	1600	µg/kg	50	µg/L
					Benzyl alcohol	100-51-6	330	µg/kg	10	µg/L
					bis(2-Chloroethoxy)methane	111-91-1	330	µg/kg	10	µg/L
					bis(2-Chloroethyl) ether	111-44-4	330	µg/kg	10	µg/L
					bis(2-Chloroisopropyl) ether	108-60-1	330	µg/kg	10	µg/L
					bis(2-Ethylhexyl) phthalate	117-81-7	330	µg/kg	10	µg/L
					bis(Chloromethyl) ether	542-88-1	330	µg/kg	10	µg/L
					bis(p-Chlorophenyl) sulfone	80-07-9	330	µg/kg	10	µg/L
					bis(p-Chlorophenyl)disulfide	1142-19-4	330	µg/kg	10	µg/L
					Butylbenzyl phthalate	85-68-7	330	µg/kg	10	µg/L
					Carbazole	86-74-8	330	µg/kg	10	µg/L
					Chrysene	218-01-9	330	µg/kg	10	µg/L
					Dibenzo(a,h)anthracene	53-70-3	330	µg/kg	10	µg/L
					Dibenzofuran	132-64-9	330	µg/kg	10	µg/L
					Dichloromethyl ether	542-88-1	330	µg/kg	10	µg/L
					Diethyl phthalate	84-66-2	330	µg/kg	10	µg/L
					Dimethyl phthalate	131-11-3	330	µg/kg	10	µg/L
					Di-n-butyl phthalate	84-74-2	330	µg/kg	10	µg/L
					Di-n-octyl phthalate	117-84-0	330	µg/kg	10	µg/L
					Diphenyl disulfide	882-33-7	330	µg/kg	10	µg/L
					Diphenyl sulfide	139-66-2	330	µg/kg	10	µg/L
					Diphenyl sulfone	127-63-9	330	µg/kg	10	µg/L
					Fluoranthene	206-44-0	330	µg/kg	10	µg/L
					Fluorene	86-73-7	330	µg/kg	10	µg/L
					Hexachlorobenzene	118-74-1	330	µg/kg	50	µg/L
					Hexachlorobutadiene	87-68-3	330	µg/kg	50	µg/L
					Hexachlorocyclopentadiene	77-47-4	1600	µg/kg	50	µg/L
					Hexachloroethane	67-72-1	330	µg/kg	10	µg/L
					Hydroxymethyl phthalimide	118-29-6	330	µg/kg	10	µg/L
					Indeno(1,2,3-cd)pyrene	193-39-5	330	µg/kg	10	µg/L

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PROJECT LIST OF ANALYTES
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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Semivolatile Organic Compounds (continued)	EPA 3550B	EPA 3510C	EPA 8270C [3]		Isophorone	78-59-1	330	µg/kg	10	µg/L
					m,p-Cresol	106-44-5	660	µg/kg	20	µg/L
					Naphthalene	91-20-3	330	µg/kg	10	µg/L
					Nitrobenzene	98-95-3	330	µg/kg	10	µg/L
					N-nitrosodi-n-propylamine	621-64-7	330	µg/kg	10	µg/L
					N-nitrosodiphenylamine	86-30-6	330	µg/kg	10	µg/L
					o-Cresol	95-48-7	330	µg/kg	10	µg/L
					Octachlorostyrene	29082-74-4	330	µg/kg	10	µg/L
					p-Chloroaniline (4-Chloroaniline)	106-47-8	330	µg/kg	10	µg/L
					p-Chlorobenzenethiol	106-54-7	330	µg/kg	10	µg/L
					Pentachlorobenzene	608-93-5	330	µg/kg	10	µg/L
					Pentachlorophenol	87-86-5	1600	µg/kg	50	µg/L
					Phenanthrene	85-01-8	330	µg/kg	10	µg/L
					Phenol	108-95-2	330	µg/kg	10	µg/L
					Phthalic acid	88-99-3	330	µg/kg	10	µg/L
					Pyrene	129-00-0	330	µg/kg	10	µg/L
					Pyridine	110-86-1	660	µg/kg	20	µg/L
					Thiophenol	108-98-5	330	µg/kg	10	µg/L
					Tentatively Identified Compounds (TICs)		NA	µg/kg	NA	µg/L
Volatile Organic Compounds	EPA 5030B/ EPA 5035	EPA 5030B	EPA 8260B		1,1,1,2-Tetrachloroethane	630-20-6	5	µg/kg	1	µg/L
					1,1,1-Trichloroethane	71-55-6	5	µg/kg	1	µg/L
					1,1,2,2-Tetrachloroethane	79-34-5	5	µg/kg	1	µg/L
					1,1,2-Trichloroethane	79-00-5	5	µg/kg	1	µg/L
					1,1-Dichloroethane	75-34-3	5	µg/kg	1	µg/L
					1,1-Dichloroethene	75-35-4	5	µg/kg	1	µg/L
					1,1-Dichloropropene	563-58-6	5	µg/kg	1	µg/L
					1,2,3-Trichlorobenzene	87-61-6	5	µg/kg	1	µg/L
					1,2,3-Trichloropropane	96-18-4	5	µg/kg	1	µg/L
					1,2,4-Trichlorobenzene	120-82-1	5	µg/kg	1	µg/L
					1,2,4-Trimethylbenzene	95-63-6	5	µg/kg	1	µg/L
					1,2-Dichlorobenzene	95-50-1	5	µg/kg	1	µg/L
					1,2-Dichloroethane	107-06-2	5	µg/kg	1	µg/L
					1,2-Dichloroethene	540-59-0	10	µg/kg	2	µg/L
					1,2-Dichloropropane	78-87-5	5	µg/kg	1	µg/L
					1,3,5-Trichlorobenzene	108-70-3	5	µg/kg	5	µg/L
					1,3,5-Trimethylbenzene	108-67-8	5	µg/kg	1	µg/L
					1,3-Dichlorobenzene	541-73-1	5	µg/kg	1	µg/L
					1,3-Dichloropropene	542-75-6	5	µg/kg	1	µg/L

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Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Volatile Organic Compounds (continued)	EPA 5030B/ EPA 5035	EPA 5030B	EPA 8260B		1,3-Dichloropropane	142-28-9	5	µg/kg	1	µg/L
					1,4-Dichlorobenzene	106-46-7	5	µg/kg	1	µg/L
					2,2-Dichloropropane	594-20-7	5	µg/kg	1	µg/L
					2,2-Dimethylpentane	590-35-2	5	µg/kg	1	µg/L
					2,2,3-Trimethylbutane	464-06-2	5	µg/kg	1	µg/L
					2,3-Dimethylpentane	565-59-3	5	µg/kg	1	µg/L
					2,4-Dimethylpentane	108-08-7	5	µg/kg	1	µg/L
					2-Chlorotoluene	95-49-8	5	µg/kg	1	µg/L
					2-Hexanone	591-78-6	20	µg/kg	5	µg/L
					2-Methylhexane	591-76-4	5	µg/kg	1	µg/L
					2-Nitropropane	79-46-9	10	µg/kg	10	µg/L
					3,3-Dimethylpentane	562-49-2	5	µg/kg	1	µg/L
					3-Ethylpentane	617-78-7	10	µg/kg	10	µg/L
					3-Methylhexane	589-34-4	5	µg/kg	10	µg/L
					4-Chlorobenzene	108-90-7	5	µg/kg	1	µg/L
					4-Chlorotoluene	106-43-4	5	µg/kg	1	µg/L
					4-Methyl-2-pentanone (MIBK)	108-10-1	10	µg/kg	5	µg/L
					Acetone	67-64-1	20	µg/kg	2	µg/L
					Acetonitrile	75-05-8	50	µg/kg	10	µg/L
					Benzene	71-43-2	5	µg/kg	1	µg/L
					Bromobenzene	108-86-1	5	µg/kg	1	µg/L
					Bromodichloromethane	75-27-4	5	µg/kg	1	µg/L
					Bromoform	75-25-2	5	µg/kg	1	µg/L
					Bromomethane	74-83-9	10	µg/kg	2	µg/L
					Carbon disulfide	75-15-0	5	µg/kg	1	µg/L
					Carbon tetrachloride	56-23-5	5	µg/kg	1	µg/L
					Chlorobenzene	108-90-7	5	µg/kg	1	µg/L
					Chlorobromomethane	74-97-5	5	µg/kg	1	µg/L
					Chlorodibromomethane	124-48-1	5	µg/kg	1	µg/L
					Chloroethane	75-00-3	5	µg/kg	2	µg/L
					Chloroform	67-66-3	5	µg/kg	1	µg/L
					Chloromethane	74-87-3	10	µg/kg	2	µg/L
					cis-1,2-Dichloroethene	156-59-2	5	µg/kg	1	µg/L
					cis-1,3-Dichloropropene	10061-01-5	5	µg/kg	1	µg/L
					Cymene (Isopropyltoluene)	99-87-6	10	µg/kg	1	µg/L
					Dibromochloroethane	73506-94-2	5	µg/kg	1	µg/L
					Dibromochloromethane	124-48-1	5	µg/kg	1	µg/L
					Dibromochloropropane	96-12-8	10	µg/kg	1	µg/L

TABLE 4
PROJECT LIST OF ANALYTES
(Page 11 of 12)

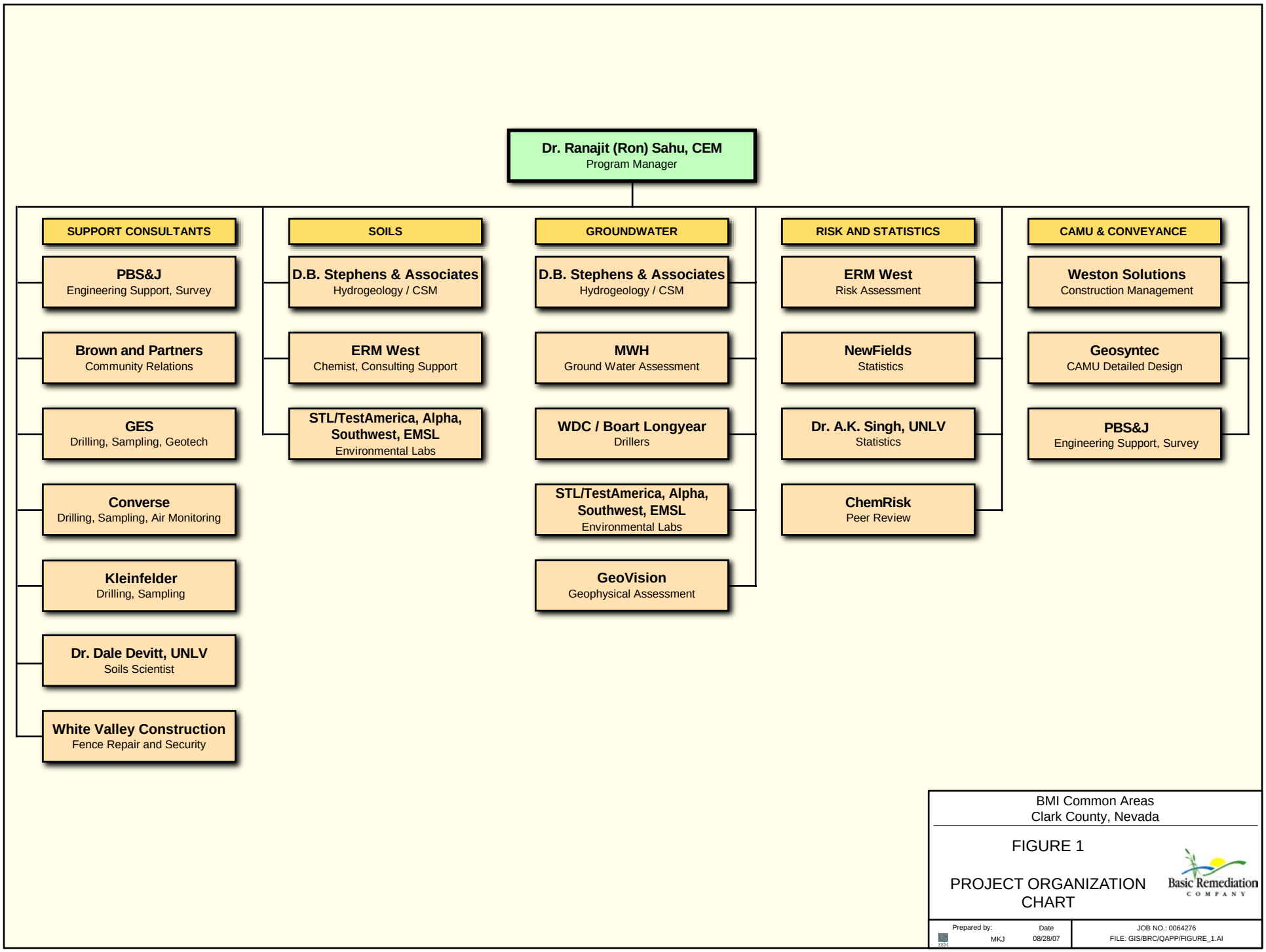
Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Volatile Organic Compounds (continued)	EPA 5030B/ EPA 5035	EPA 5030B	EPA 8260B		Dibromomethane	74-95-3	5	µg/kg	1	µg/L
					Dichloromethane (Methylene chloride)	75-09-2	5	µg/kg	1	µg/L
					Dimethyldisulfide	624-92-0	5	µg/kg	5	µg/L
					Ethanol	64-17-5	200	µg/kg	250	µg/L
					Ethylbenzene	100-41-4	5	µg/kg	1	µg/L
					Freon-11 (Trichlorofluoromethane)	75-69-4	5	µg/kg	1	µg/L
					Freon-113 (1,1,2-Trifluoro-1,2,2-trichloroethane)	76-13-1	5	µg/kg	1	µg/L
					Freon-12 (Dichlorodifluoromethane)	75-71-8	10	µg/kg	2	µg/L
					Heptane	142-82-5	5	µg/kg	1	µg/L
					Isoheptane (same as 2-Methylhaxane)	31394-54-4	TBD	µg/kg	TBD	µg/L
					Isopropylbenzene	98-82-8	5	µg/kg	1	µg/L
					m,p-Xylene	mp-XYL	5	µg/kg	2	µg/L
					Methyl ethyl ketone (2-Butanone)	78-93-3	20	µg/kg	5	µg/L
					Methyl iodide	74-88-4	5	µg/kg	2	µg/L
					MTBE (Methyl tert-butyl ether)	1634-04-4	5	µg/kg	2	µg/L
					n-Butyl benzene	104-51-8	5	µg/kg	1	µg/L
					n-Propylbenzene	103-65-1	5	µg/kg	1	µg/L
					Nonanal	124-19-6	10	µg/kg	5	µg/L
					o-Xylene	95-47-6	5	µg/kg	1	µg/L
					sec-Butylbenzene	135-98-8	5	µg/kg	1	µg/L
					Styrene	100-42-5	5	µg/kg	1	µg/L
					tert-Butyl benzene	98-06-6	5	µg/kg	1	µg/L
					Tetrachloroethene	127-18-4	5	µg/kg	1	µg/L
					Toluene	108-88-3	5	µg/kg	1	µg/L
					trans-1,2-Dichloroethene	156-60-5	5	µg/kg	1	µg/L
					trans-1,3-Dichloropropene	10061-02-6	5	µg/kg	1	µg/L
					Trichloroethene	79-01-6	5	µg/kg	1	µg/L
					Vinyl acetate	108-05-4	5	µg/kg	2	µg/L
					Vinyl chloride	75-01-4	5	µg/kg	2	µg/L
					Xylenes (total)	1330-20-7	10	µg/kg	3	µg/L
					Tentatively Identified Compounds (TICs)		NA	µg/kg	NA	µg/L
Water Quality Parameters	NA	EPA 120.1	NA	EPA 120.1	Conductivity	COND	NA	mg/kg	10	µohms/cm
		EPA 130.2		EPA 130.2	Hardness, total	Hardness	NA	mg/kg	5	mg/L
		EPA 160.1		EPA 160.1	Total dissolved solids	TDS	NA	mg/kg	5	mg/L
		EPA 160.2		EPA 160.2	Total suspended solids	TSS	NA	mg/kg	5	mg/L
		EPA 310.1		EPA 310.1	Alkalinity, Total (as $CACO_3$)	ALK	NA	mg/kg	5	mg/L
					Bicarbonate alkalinity	71-52-3	NA	mg/kg	5	mg/L
					Carbonate alkalinity	3812-32-6	NA	mg/kg	5	mg/L
					Hydroxide alkalinity	OH-ALK	NA	mg/kg	5	mg/L

TABLE 4
PROJECT LIST OF ANALYTES
(Page 12 of 12)

Parameter of Interest	Preparation Method		Analytical Method		Compound List	CAS Number	Laboratory Limits			
	Soil	Water	Soil	Water			Soil		Water	
Flashpoint	NA		NA	EPA 1010	Flammables	NA	TBD	mg/kg	TBD	mg/L
Total Petroleum Hydrocarbons	EPA 3550	EPA 3510	EPA 8015M	EPA 8015M	Diesel	64742-46-7	25	mg/kg	0.5	mg/L
					Mineral Spirits	NA	25	mg/kg	0.5	mg/L
	EPA 3550	EPA 3510	EPA 8015B	EPA 8015B	Gasoline	8006-61-9	25	mg/kg	0.5	mg/L
	EPA 1664A	EPA 1664A	EPA 1664A	EPA 1664A	Oil/Grease	68153-81-1	25	mg/kg	0.5	mg/L
White Phosphorus	EPA 7580M		EPA 7580M		White phosphorus	12185-10-3	TBD	mg/kg	TBD	mg/L
Methyl Mercury	EPA 1630		EPA 1630		Methyl mercury	22967-92-6	TBD	mg/kg	TBD	mg/L

Notes:
Reporting Limits - Based on laboratory limits for primary laboratory (TestAmerica).
Laboratory limits are subject to matrix interferences and may not always be achieved in all samples.
TBD = To be determined by the laboratory prior to sample analysis and submitted for approval.
The laboratory will be instructed to report the top 25 Tentatively Identified Compounds (TICs) under method 8260B and 8270C.
* = Activities for specific radionuclide will be back-quantitated from those analyzed.
NA = Not applicable.
[1]For polynuclear aromatic hydrocarbons, Method 8270C is the primary analytical method, but Method 8310 may be used if necessary.
[2]TestAmerica-Richland, WA method.
[3]Method 3540 for extraction and Method 3640 for cleanup are to be used as appropriate.

FIGURES



BMI Common Areas
Clark County, Nevada

FIGURE 1

PROJECT ORGANIZATION CHART

Basic Remediation COMPANY

Prepared by:	Date	JOB NO.: 0064276
MKJ	08/28/07	FILE: GIS/BRC/QAPP/FIGURE_1.AI

N

Las Vegas Wash Extent

CITY OF HENDERSON LANDFILL

WESTON HILLS DEVELOPMENT

TUSCANY DEVELOPMENT

CITY OF HENDERSON BIRD VIEWING PRESERVE

CITY OF HENDERSON NORTHERN RIB PONDS

CITY OF HENDERSON WATER RECLAMATION FACILITY

Parcel 3

Historic Ditches

SUNSET ROAD

Parcel 4B

Parcel 5/6

Trade Effluent Ponds

CITY OF HENDERSON SOUTHERN RIB PONDS

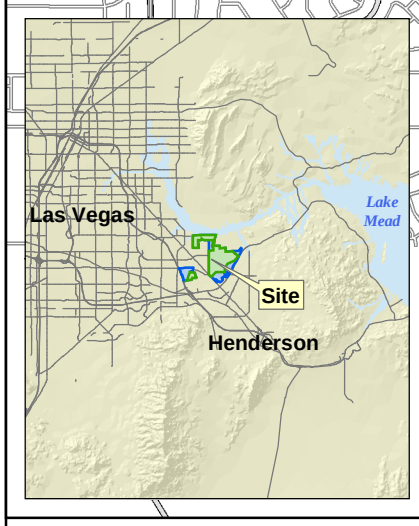
Parcel 9

CORRECTIVE ACTION MANAGEMENT UNIT (CAMU)

BMI Siphon

Parcel 4A

Industrial Facilities



2,000 1,000 0 2,000

Feet

Site Soil Boundary

Site AOC3 Boundary

BMI Common Areas
Clark County, Nevada

FIGURE 2

PROJECT MAP

Basic Remediation COMPANY

Prepared by:	Date	JOB No. 0064276
MKJ	08/28/07	FILE: GIS/BRC/QAPP/FIGURE_2.MXD

APPENDIX A

NDEP COMMENTS ON QUALITY ASSURANCE PROJECT PLAN AND BRC'S RESPONSE TO COMMENTS

APPENDIX A-1
Response to NDEP Comments Dated December 13, 2005 on the October 2005 BRC Quality Assurance Project Plan, Revision 0

1. General comment, this document has a number of QA/QC issues, many of which are listed below. It does not appear that a rigorous QA/QC check was performed prior to submittal.

Response: *Comment noted. A thorough QA/QC check has been performed prior to re-submittal.*

2. General comment, this Quality Assurance Project Plan (QAPP) is a generic document for activities that are planned at the BMI Common Areas. There are few details in the Data Generation and Acquisition section that truly describe an experimental design. The QAPP indicates these details will be provided in the Field Sampling Plans and Closure Plan that are under development. Before proceeding with sampling, the project should develop a conceptual site model and develop planning documents that address sampling and data analysis in much greater detail. The Data Quality Objectives (DQOs) process should be used to develop these additional details and the NDEP understands that these DQOs are in development. The DQO process should provide the necessary specifications to design a qualitative and quantitative sample design and data collection effort. Ideally, the DQO process will be completed prior to rewriting this quality planning document so that a logical process has been used to establish the adequacy of data that is required. It is also noted that the QAPP only contains human health screening values, ecological risk values may need to be established, depending upon the outcome of the quality planning process. Any additional risk values that are established will need to be compared with the laboratory limits provided in Table 4 to ensure the analytical methods have sufficient sensitivity. This topic can be explored and discussed further in a meeting, if necessary.

Response: *The risk-based screening values have been updated to include those developed as part of the draft Ecological Risk Assessment Methodology, but these have not yet been formally reviewed or approved by NDEP. In addition, the screening table (Table 2) now includes Region 9 PRGs, soil screening levels (SSLs), maximum contaminant levels (MCLs), OSHA permissible exposure limits (PELs), and freshwater chronic ambient water quality criteria (AWQC).*

3. Section A4.3, pages 10 and 11, the QAPP refers to a number of management positions yet it is unclear who will assume the role of the QA Manager Section A9.2, page 24). The point of contact for this position should be specified in the QAPP. This comment also applies to Section A9.2.

Response: *Dr. Ranajit Sahu is now identified as the QA Manager in the report in Section A4.2.*

4. Section A5, page 12, BRC should note that the common areas west of Boulder Highway include more than the CAMU area.

Response: *This information is now indicated in the report, as well as on Figure 2.*

5. Section A6, page 13, BRC refers to the "draft Closure Work Plan", the document title is "draft Closure Plan". Please correct this reference throughout this document and all future documents.

Response: *This reference has been changed throughout the report. Currently it is referred to as the Closure Plan (BRC 2006, in preparation).*

6. Section A6.1 and A6.2, pages 13 through 15, it is not clear why this QAPP includes such specific definitions for the project Site. It is the belief of the NDEP that this QAPP would be applicable and valid for wherever work was to occur. In addition, the definitions of the various parts of the project site will be contained in detail in other documents to be reviewed and approved separately (e.g.: the Closure Plan and the Phase 3 Settlement Agreement). The language contained in these sections is largely extraneous and should be pared down. Furthermore, as noted above, the remaining Common Areas west of Boulder Highway are not described herein.

Response: *This information has been reduced.*

7. Section A6.1, page 14, BRC refers to "borox", please clarify if this is intended to be "borax".

Response: *In response to comment #6 above, this information has been removed from the report.*

8. Section A7, page 16, BRC references preliminary risk-based screening levels (RBSLs), however, the methodology for calculating these RBSLs is not referenced or presented and hence cannot be reviewed. The revised version of this QAPP shall include an appendix with detailed calculations and references which presents the derivation of the RBSLs. The NDEP will review this issue at that time.

Response: *Reference to the human health and ecological risk assessment methodology sections of the Closure Plan has been added to the text. In addition, Table 2 now includes now includes Region 9 PRGs, soil screening levels (SSLs), maximum contaminant levels (MCLs), and freshwater chronic ambient water quality criteria (AWQC).*

9. Section A7, page 16, the QAPP states, "As part of the future development of the site, data needs were evaluated for assessing chemical distributions in soil, sediment, groundwater, and surface water, for determining human health and ecological risk, and for developing remedial alternatives for the site." This reference to ecological risk indicates the remediation alternatives will be based on both human health and ecological risk, however, the Risk-based Screening Levels in Table 3 are all human health based. Please clarify.

Response: *See response to comment #2 above.*

10. Section A7, pages 16 and 17, it should be noted that the project DQOs will be drafted and included in the revised Closure Plan and will not be finalized until the NDEP approves that document.

Response: *Comment noted.*

11. Section A7.1, page 18, the equation for %RPD on page 18 is in error, one correct form of this equation is provided here.

$$\%RPD = \frac{|S - D|}{(S + D)/2} X 100$$

Where S = the concentration of the original sample, D = the concentration of the duplicate sample.

Response: *This equation has been corrected.*

12. Section A7.1, page 19, %R equation, please note that the equation for %R is missing a minus sign in the numerator.

Response: *This equation has been corrected.*

13. Section A8, page 21, it may be helpful to note that the site has a number of unique analytes and that some of the analyses may not have an available Nevada-certified laboratory. It should be noted that these analytes will be discussed with the NDEP and handled on a case-by-case basis.

Response: *This information has been provided in the report.*

14. Section A9.2, page 22, this section references laboratory quality assurance plans in Appendix A, Appendix A is missing. The revised QAPP shall include all of the applicable laboratory quality assurance plans. It should also be noted that the site-related chemical (SRC) list has not been finalized and it may not be possible to complete a revised version of this QAPP until the SRC list is finalized.

Response: *Appendix A [Note: now Appendix B], which includes all laboratory quality assurance plans, is included in the report. The site-related chemical (SRC) list has been updated to the most recent (March 2006) version of this list.*

15. Section A9.2, page 22, BRC states, "Each laboratory will provide a data package for each sample delivery group or analysis batch that is comparable to a full Contract Laboratory Program (CLP) package. The format of the data may differ from CLP requirements. Each data package will contain all information required for a complete QA review, including the following: …" The bullets listed on page 23 are representative of a full, level IV, CLP package. However, in Section B10.2 (pages 38-39), the QAPP states, "For 80 percent of the samples analyzed by the laboratory, the laboratory reports will be consistent with USEPA Level III documentation … For the remaining 20 percent of the samples collected, the laboratory reports will be more comprehensive and include these additional data records, consistent with USEPA Level IV documentation requirements …" The QAPP should clarify the apparent discrepancy between the two sections.

Response: *This issue has been clarified and made consistent throughout the report. Each data package will be comparable to a full Level IV CLP package.*

16. Section B5.2.5, page 34, BRC states, "Field duplicate samples will not be collected for soil samples due to matrix non-homogeneity." Soil and sediments samples are inherently less homogeneous than aqueous samples; however, including duplicate samples in the Site plan can provide important information on heterogeneity. The decision to eliminate duplicate solid samples should be re-evaluated during the DQO process.

Response: *This sentence has been deleted from the report text. In addition, this section has been revised to address collection of field duplicate samples in both solid and aqueous media.*

17. Sections B5.2.6, B6.1 and B6.2, BRC refers to several QA items that "may" be performed. This includes Performance Evaluation Samples (Section B5.2.6), Field Audits (Section B6.1) and Laboratory Audits (Section B6.2). The QAPP should discuss the necessity of including these steps and include a goal for how many will be included in the overall QA program. The reference to "may be included" is insufficient.

Response: *The QAPP text has been revised to reflect the following: 1) because selected laboratories are licensed by the State of Nevada as certified testing laboratories, neither performance evaluation samples, nor laboratory audits are anticipated for the project; however, a footnote has also been added indicating that a Nevada-certified laboratory may not be available for some of the analyses (for example, asbestos)—these will be discussed with NDEP and handled on a case-by-case basis; and 2) field audits will only be conducted, as needed, when significant discrepancies are identified that warrant evaluation of field practices. In these cases, NDEP will be consulted prior to the performance of any field audits for the project.*

18. Table 1, this table has not been completed, currently, only the City of Henderson is receiving copies of any reports. Additionally, no one is listed for Clark County.

Response: *As indicated in the report, Table 1 presents a general distribution list for the project. Each document prepared will include this distribution list with an indication of how each document will be distributed. There are blank lines included for additional names, as warranted.*

19. Table 2, the NDEP has the following comments (in addition to the comment above):
    a. The column "Basis" has a number of abbreviations; none of these are defined in the notes section of the table.
    b. This table will need to be revised once the SRC list is finalized.

Response: *Abbreviations have defined and the table includes the most recent (March 2006) version of the SRC list. In addition, it has been expanded as indicated in response to comment #2.*

20. Tables 2 and 4, there are several Laboratory Limit values in Table 4 that indicate the laboratory sensitivity does not meet the Human Health Screening Values in Table 2. These are identified below.
    a. Arsenic. 0.79 mg/kg versus 1 mg/kg.
    b. N-nitrosodi-n-propylamine. 69 ug/kg versus 330 ug/kg.
    c. Methyl carbophenothion in not found in Table 2.
    d. Thorium-229. There are no values in Table 4.

Response: *Comment noted.*

21. Table 3, the NDEP has the following comments:
    a. Methyl mercury, using EPA Method 1630, was not included on this table.
    b. According to EPA Method 7196A for hexavalent chromium, the holding period for soils is 24 hours, not 28 days.
    c. A number of the methods (8270, 8081, 8082, 8151, and 8310) require addition of $Na_2S_2O_3$ if residual chlorine is present. This may be unnecessary for the groundwater but is noted here for completeness.
    d. The holding period for VOCs in soils using an Encore sampler is 48 hours, not 40 days.
    e. Most radionuclides have a holding time of 6 months or less, the table lists 12 months for groundwater.
    f. Perchlorate analysis was not included in this table.

Response: *The table has been corrected as appropriated. It should be noted that the holding time designated in EPA Method 7196A is for water or extract samples. EPA has not designated a holding time for hexavalent chromium in soil. According to Method 3060A, hexavalent chromium has been shown to be quantitatively stable in field-moist soil samples for 30 days from sample collection. This 30 day holding time for soil is consistent with standard laboratory and sampling and analysis procedures.*

22. Table 4, this table will need to be updated when the SRC list is finalized.

Response: *The table includes the most recent (March 2006) version of the SRC list.*

23. Figure 1, Dr. A.K. Singh is listed as providing support for the statistics portion of the project, please describe what areas of expertise Dr. Singh will be addressing.

Response: *Dr. Singh is the secondary project statistician who will be involved with QA/QC of statistical analyses.*

24. Appendix A, the cover sheet is illegible. Also, as noted above, nothing has been provided in Appendix A.

Response: *This is an Adobe Acrobat error. It has been corrected.*

25. Appendix B, the cover sheet is illegible.

Response: *This is an Adobe Acrobat error. It has been corrected.*

APPENDIX A-2
Response to NDEP Comments Dated March 30, 2006 on the March 2006 BRC Quality Assurance Project Plan, Revision 1

The NDEP has received and reviewed BRC's correspondence identified above and provides comments below.

1. Please note that these comments do not address the inadequacies of the DQM tool that is proposed to be used by BRC. It is noted that there are quality issues with the DQM tool. Specific issues are addressed in NDEP's comments on BRC's Data Validation Summary Report – 2004 Hydrogeologic Characterization (Dataset 27) dated February 2006, which is transmitted under separate cover. The QAPP should be revised as necessary to address the issues with the DQM tool.

Response: *The EQuIS DQM tool will no longer be used for data validation. The following text changes (in redline/strikeout) have been made to Section D1.2: "Data validation will be performed for ~~a minimum of 20~~ 100 percent of the data (reported with raw data at Level IV) that will be used in support of site characterization and subsequent evaluations; however, as a general rule of thumb, 100 percent of the data will undergo Level III data validation, and 10 to 20 percent will undergo Level IV data validation. The percentage and types of data to be validated will be defined in the site-specific investigation work plan, FSP, and/or other work plan submitted to NDEP for each data collection activity."*

2. General comment, the QAPP should address how VOA data will be qualified (including rejection) if the cooler temperatures exceed the specified range (4 ± 2ºC)? This should include both detects and non-detects.

Response: *The following text has been added to Section D1.3 to address both holding times and temperatures: "Sample results that were generated after the required holding time but less than two times after the holding time will be qualified as estimated (J or UJ). If the samples were prepared after two times the holding time was exceeded, results will be qualified as rejected (R). Sample results that were generated with storage temperatures less than 2°C or greater than 6°C or as estimated (J) for the positive results and estimated or rejected (UJ or R) for non-detects based on an analyte-specific review."*

3. Section A4.4, STL-Richland has not been included in this section and should be. Appendix B will also require revision as a function of this addition.

Response: *STL-St. Louis is the primary point of contact for this project for all of STL's laboratories. All samples are shipped to STL-St. Louis who then handle shipment of samples to the appropriate laboratories in other parts of the country, including Richland, depending on what analysis that particular laboratory is performing. However, reference to STL Richland for radionuclide analyses has been added to Section A4.4, and the STL Richland quality manual is included in Appendix B.*

4. Section A6, there should be a section A6.3 which includes the remaining Common Areas not addressed by Section A6.1 and A6.2.

Response: *Section A6.3 has been added which discusses the BMI Siphon and the off-site ditches. These areas have also been identified in Figure 2.*

5. Table 2, please note that the NDEP has not verified the adequacy of the screening levels outlined in this table as it is BRC's responsibility to insure that data being collected are suitable for future risk assessment work.

Response: *Comment noted. To the extent possible, this table includes all relevant human health and ecological screening levels appropriate for the project.*

6. Table 4, please note that the NDEP has not verified that this table matches the most recent (March 2006) list of site-related chemicals, however, it is noted that trichloroacetaldehyde is not included in this table.

Response: *Tables 2 and 4 were updated to match the most recent site-related chemicals list (trichloroacetaldehyde was included in the table under Method EPA 8315A).*

7. Appendix A, the NDEP has the following comments:
   a. BRC response to comment (RTC) #14, this response should address Appendix B not Appendix A.

Response: *Comment noted. The response was to comments on the original version of the QAPP for which this was Appendix A, but is now Appendix B.*

   b. RTC #21, the response indicates that Table 3 has been corrected as appropriate, however, Table 3 lists "4 days to analysis" for hexavalent chromium soil extracts. The Response to this comment is correct; the holding time in method 7196A is for waters or extracts. Therefore, the soil extract has a holding time of 24 hours, not 4 days.

Response: *From SW-846, Chapter 3-Inorganic Analytes (Revision 4, USEPA 2000), Table 3-1, Hexavalent Chromium, Solid: "30 days to extraction; 4 days from extraction to analysis. Store at 4 ± 2°C until analysis"*

REDLINE VERSION

BRC QUALITY ASSURANCE PROJECT PLAN

BMI COMMON AREAS
CLARK COUNTY, NEVADA

Prepared for:
Basic Remediation Company (BRC)
875 West Warm Springs Road
Henderson, Nevada 89015

Prepared by:
ERM-West, Inc.
2525 Natomas Park Drive, Suite 350
Sacramento, California 95833

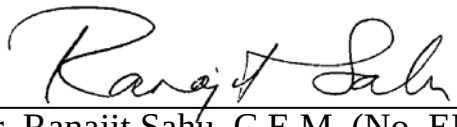
MWH
3321 Power Inn Road, Suite 300
Sacramento, California 95826

AUGUST 2007~~APRIL 2006~~

A PROJECT MANAGEMENT

A1. TITLE AND APPROVAL SHEET

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. I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.



August 31, 2007

Dr. Ranajit Sahu, C.E.M. (No. EM-1699, Exp. 10/07/200~~7~~9) Date
BRC Project Manager

A2. TABLE OF CONTENTS

A2.1 LIST OF TABLES

A2.2 LIST OF FIGURES

NUMBER	TITLE
1	Project Organization Chart
2	Project Map

A2.3 LIST OF APPENDICES

LETTER	TITLE
A	NDEP Comments on Quality Assurance Project Plan-Revision 0 and BRC's Response to Comments
B	Laboratory Quality Assurance Manuals
C	Data Management Plan

A2.4 ACRONYMS AND ABBREVIATIONS

Alpha	Alpha Analytical, Inc.
AOC3	Settlement Agreement and Administrative Order on Consent: BMI Common Areas, Phase 3
AWQC	ambient water quality criteria
ASTM	American Society of Testing and Materials
BEC	Basic Environmental Company
BMI	Basic Management, Incorporated
BRC	Basic Remediation Company
C.E.M.	Certified Environmental Manager
CLP	Contract Laboratory Program
CAMU	Corrective Action Management Unit
DBSA	D.B. Stephens and Associates
DQI	data quality indicator
DQO	data quality objective
~~Del Mar~~	~~Del Mar Analytical~~
EDD	electronic data deliverable
EMSL	EMSL Analytical, Inc.
~~EMS~~	~~EMS Laboratories~~
ESL	ecological screening level
FSP	Field Sampling Plan
FSSOP	Field Sampling and Standard Operating Procedures
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSP	Health and Safety Plan
HISSC	Henderson Industrial Site Steering Committee
Kerr-McGee	Kerr McGee Chemical, LLC
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MSD	matrix spike duplicate

A2.4 ACRONYMS AND ABBREVIATIONS

MCLs	maximum contaminant levels
MDL	method detection limit
MRL	method reporting level
NIST	National Institute of Standards and Technology
NDEP	Nevada Division of Environmental Protection
NFA	No Further Action
%R	percent recovery
PE	performance evaluation
Pioneer	Pioneer Chlor Alkali Company, Inc.
PARCC	precision, accuracy, representativeness, comparability, and completeness
PRG	preliminary remediation goal
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RIB	Rapid Infiltration Basin
RME	reasonable maximum exposure
RPD	relative percent difference
RBSL	risk-based screening level
SAP	Sampling and Analysis Plan
~~STL~~	~~Severn Trent Laboratories~~
SRC	site-related chemical
SSL	soil screening level
SOP	Standard Operating Procedure
SWA	Southwest Analytical
TestAmerica	TestAmerica Analytical Testing Corp.
TIMET	Titanium Metals Corporation
~~USEPA~~	~~U.S. Environmental Protection Agency~~

A3. DISTRIBUTION LIST

Most of the data intense tasks will be accomplished by Basic Remediation Company (BRC) or Basic Environmental Company (BEC), and their consultants and subcontractors with oversight, review, and approval by the State of Nevada Department of Conservation and Natural Resources, Division of Environmental Protection (NDEP). Table 1 presents a general distribution list for the project. Each document prepared will include this distribution list with an indication of how each document will be distributed.

A4. PROJECT ORGANIZATION

A project organization chart is provided on Figure 1. The project organization defines the lines of communication and identifies key personnel assigned to various project activities. The respective work plan will provide a description of the organizational structure and specific responsibilities of the individual positions for the respective project activities. The individuals participating in the project and their specific roles and responsibilities are discussed below.

A4.1 Regulatory Agency

NDEP is the oversight agency for Basic Management, Incorporated (BMI) Common Areas (Site) activities. NDEP will provide regulatory oversight for all aspects of investigative and remedial activities at the Site and offer direction on NDEP policy and environmental objectives. All field activities and reports will be supervised by a State of Nevada Certified Environmental Manager (C.E.M.). This revision of the Quality Assurance Project Plan (QAPP), Revision 3~~1~~, incorporates comments received from NDEP, dated December 13, 2005, on Revision 0 of the QAPP, dated October 2005, and comments received from NDEP, dated March 30, 2006, on Revision 1 of the QAPP, dated March 2006. This revision also incorporated changes based on the NDEP-approved Standard Operating Procedure (SOP) 40 (Data Review/Validation), which is found in the BRC *Field Sampling and Standard Operating Procedures* (FSSOP) manual (BRC, ERM and MWH 2007). The NDEP comments and BRC's response to these comments are included in Appendix ~~Appendix~~ A.

A4.2 Basic Remediation Company/Basic Environmental Company

Dr. Ranajit Sahu, C.E.M. is the Director of Environmental Services for BRC and BEC. Dr. Sahu will serve as Project Manager for BRC/BEC. Dr. Sahu will be responsible for directional decisions, as well as for budget control, and for work conducted on the project on behalf of

BRC/BEC. In addition, Dr. Sahu will serve as the quality assurance (QA) Manager for the project.

A4.3 Investigation Consultants

The investigation contractor has responsibility for assigned phases of investigation and reporting. Together, the management team (Program Director, Project Manager, Task Managers, Technical Leads, and Field Managers) will be responsible for the technical planning and implementation of the prescribed work. Other responsibilities include strategy development, budget control, project schedule, and document review. The QA staff has responsibility for effective planning, verification, and management of QA activities associated with the assigned project.

A4.3.1 MWH

As directed by BRC, MWH will assign technical staff to provide expertise and oversight in their respective fields of knowledge. Mr. Tony Mikacich~~Mark Jones~~ is the MWH Project Manager. Mr. Mikacich~~Jones~~ will provide direction to MWH technical staff for programs executed by MWH.

A4.3.2 ERM

As directed by BRC, ERM will assign technical staff to provide expertise and oversight in their respective fields of knowledge. Mr. Mark Jones~~Ms. Jill Quillin, C.E.M.,~~ is the ERM Project Manager. Mr. Jones~~Ms. Quillin~~ will provide direction to technical staff for programs implemented by ERM. Ms. Jill Quillin, C.E.M., also provides technical support and direction for the project.

A4.3.3 D.B. Stephens and Associates

As directed by BRC, D.B. Stephens and Associates (DBSA) will assign technical staff to provide expertise and oversight in their respective fields of knowledge. Stephen Cullen, PhD, C.E.M., is the DBSA Project Manager. Dr. Cullen will provide direction to technical staff for programs implemented by DBSA.

A4.4 Laboratories

It is anticipated that the primary off-site laboratories will be TestAmerica Analytical Testing Corp. (TestAmerica~~Severn Trent Laboratories (STL~~) in St. Louis, Missouri; TestAmerica~~STL~~ in Richland, Washington (for radionuclide analyses); Alpha Analytical, Inc. (Alpha) in Sparks,

Nevada; EMSL~~Del Mar~~ Analytical, Inc. (EMSL ~~(Del Mar~~) in Westmont, New Jersey~~Irvine, California; EMS Laboratories (EMS) in Pasadena, California~~; and Southwest Analytical, Inc. (SWA) in Las Vegas, Nevada. TestAmerica~~STL~~, Alpha, EMSL~~Del Mar, EMS~~ and SWA will perform analytical testing for samples collected during various field investigations. The respective laboratory's project manager will report to the Field Manager, on all aspects of the sample analysis. In addition, the QA Manager will be advised of any matters related to data quality during the course of the investigation. The laboratory will conform to the QA and quality control (QC) procedures, outlined in the respective laboratory Quality Assurance Plans (maintained by the laboratory) and laboratory ~~Standard Operating Procedures (~~SOPs~~)~~. Copies of laboratory quality manuals are included in Appendix B and maintained in the project files.

A5. PROBLEM DEFINITION/BACKGROUND

This QAPP has been prepared by BRC to address QA and QC policies associated with the collection of environmental data for characterization activities at the Site. All sampling and analysis activities will be conducted under the oversight of NDEP, pursuant to the Phase II Consent Agreement for the BMI Common Areas (Consent Agreement) executed between the Henderson Industrial Site Steering Committee (HISSC) and NDEP on February 23, 1996. This QAPP has been designed to support the data collection activities associated with the various sampling and analysis tasks pertaining to any characterization activities conducted at the Site.

This QAPP is an integral part of the project repository for the BMI Common Areas and is to be incorporated by reference as the general guidance document for implementing QA/QC procedures for all sampling and analysis programs conducted at the Site. U.S. Environmental Protection Agency (USEPA) policy requires a QAPP for all environmental data collection projects mandated or supported by the USEPA through regulations or other formalized means (USEPA 2002a), such as site characterization and risk assessment. The purpose of this QAPP is to identify the methods to be employed to establish technical accuracy, precision, and validity of data that are generated for decision making purposes.

The project Site is located in Clark County, Nevada, approximately 13 miles southeast of Las Vegas, Nevada. The Site is separated into two main properties, divided by Boulder Highway (Figure 2). West of Boulder Highway is the Corrective Action Management Unit (CAMU) Area (hereinafter referred to as the 'CAMU') as well as other properties owned by BEC as shown on Figure 2. East of Boulder Highway is the BMI Upper and Lower Ponds Area (hereinafter referred to as the 'Eastside').

BRC's overall project goal for the Eastside is that post-certification conditions at the Site be such that residual chemical concentrations in Site soils are either representative of background conditions, or do not pose an unacceptable risk to human health and the environment under all anticipated future land uses, considering all relevant pathways and using the best possible risk assessment methodology, per USEPA guidance. BRC plans to request a finding of No Further Action (NFA) from NDEP to document that this goal has been attained. Once granted an NFA, BRC plans to restore the property to a higher and beneficial use via implementation of an organized, multi-phased development program. Redevelopment of the Eastside is proposed; however, development plans have not been finalized at this time.

Contaminated soils excavated from the Eastside will be transported to the CAMU for containment. A portion of the CAMU will be two below ground areas that will be excavated, and another portion that will be above ground. The CAMU will be fully lined and capped. The CAMU will permanently inter these off-site contaminated soils and will also cap the slit trenches, thereby providing point source control of possible leaching contaminants. The CAMU will have appropriate institutional controls and all requisite monitoring devices to ensure the integrity of its contents.

A6. PROJECT DESCRIPTION

The following is a brief summary of the CAMU and Eastside properties. A comprehensive narrative of historical Site ownership and operations for the Eastside is found in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007). ~~2006, in preparation), which is currently undergoing revision. Reference to the revised report will be provided in subsequent revisions of this QAPP.~~ A comprehensive narrative of historical Site ownership and operations at the CAMU is found in the draft *CAMU Area* Conceptual Site Model (DBS&A and BRC 2007)~~, currently in preparation~~.

A6.1 Eastside

The Eastside consists primarily of former wastewater effluent ponds (now dry), into which various wastewaters from the Basic Magnesium Complex were discharged from the early 1940s through 1976, and the system of conveyance ditches that were used to transport wastewaters to the ponds. The Eastside also includes inactive, lined ponds used by Titanium Metals Corporation (TIMET) in the southwestern portion of the Upper Ponds that were constructed in the same location as the former wastewater effluent ponds. In addition to the inactive and former effluent ponds and conveyance ditch segments, the Eastside also includes adjoining lands northeast of

Boulder Highway, northwest of Lake Mead Drive, and south of the Las Vegas Wash. The Eastside, as defined for the purpose of this QAPP, encompasses an area of approximately 2,330 acres and includes the following land-based areas:

- The portions of the BMI Common Areas addressed by the 1996 Consent Agreement between NDEP and the HISSC that are east of Boulder Highway, excluding Parcels 4A and 4B;
- Parcel 9 South, a 9.5-acre parcel west of Boulder Highway that is included in the 1996 Consent Agreement (it should be noted that Parcel 9 North has been issued an NFA by NDEP, and is not included in the Site definition); and
- The Southern Rapid Infiltration Basins (RIBs) and the TIMET Ponds area, which are not included in the 1996 Consent Agreement.

In addition, groundwater flowing beneath the Eastside, as well as Exclusion Areas 4A and 4B, is also addressed by this QAPP. Figure 2 illustrates the boundaries of the Eastside property.

A6.2 Corrective Action Management Unit (CAMU)

The CAMU is located within the boundaries of property owned and operated by BEC, in an area formerly designated as the Clark County Industrial Plant Area, and is bordered on all sides by former and present industrial production facilities of the BMI Industrial Complex. More specifically, the CAMU is bounded on the south by property owned by Pioneer. The eastern boundary is the border between property owned by Kerr-McGee and property owned by BEC. The northern boundary is defined by the northern limit of the toe of the closed BMI Landfill. The western boundary is defined by a northwest trending line that runs along the western margin of the proposed aggregate borrow pit area. The existing BMI Landfill, the western-most trade effluent pond and portions of the adjacent second trade-effluent pond are within the boundary of the CAMU. Figure 2 illustrates the boundaries of the CAMU and remainder of the ~~Westside~~ property west of Boulder Highway.

The CAMU will contain contaminated soils excavated from the Eastside, as more fully described in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007). ~~2006, in preparation).~~ Plans for the CAMU being proposed at the Site are currently in the engineering design phase and have been~~will be~~ submitted to NDEP for its review in the~~as a revised~~ Remedial Action Plan (BRC 2007).

A6.3 Other Areas

Other areas, as discussed in Appendix E, Section 3.1.24 of the Settlement Agreement and Administrative Order on Consent: BMI Common Areas, Phase 3 (AOC3), outside the boundaries of both the Eastside and the CAMU as discussed above include the following:

- BMI Siphon; and
- Portions of the western and northwestern ditches north of the CAMU boundary and south of the Western Hook portion of the Eastside.

These areas are shown on Figure 2.

A7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT OF DATA

In preparation for future site development, data needs were evaluated for assessing chemical distributions in soil, sediment, groundwater, and surface water, for determining human health and ecological risk, and to develop remedial alternatives for the site. The seven-step data quality objectives (DQO) process (USEPA 2006~~2000~~) will be used to identify the adequacy of existing data and the need for additional data, to develop the overall approach to each study element, and ultimately to develop the various Sampling and Analysis Plans (SAPs) or Field Sampling Plans (FSPs) for the Site. The DQO processes for the various aspects of the site characterization are provided in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007 ~~2006, in preparation~~).

The need for low-level reporting limits has been identified for the project. Preliminary risk-based screening levels (RBSLs) and ecological screening levels (ESLs) have been developed to identify analytical sensitivity levels that will be sufficient to determine risks to ecological and human health. The methodologies for developing these screening levels are presented in the human health and ecological risk assessment sections of the *BRC Closure Plan* (BRC, ERM ~~2006, in preparation)~~, and DBS&A 2007).~~are pending approval by NDEP.~~ Although preliminary RBSLs and ESLs can be met for many analytes, modifications to optimize laboratory method reporting levels (MRLs) may be needed to meet ecological and human health protective levels. Preliminary RBSLs and ESLs are provided in Table 2. In addition to these RBSLs and ESLs, regulatory established screening levels and standards (USEPA Region 9 preliminary remediation goals [PRGs], USEPA soil screening levels [SSLs], maximum contaminant levels [MCLs], and chronic freshwater ambient water quality criteria [AWQC]) are also presented in Table 2. Analytical sensitivity is discussed further in the following sections.

The following are general project DQOs to support the qualitative and quantitative design of data collection efforts and to ensure that cleanup goals that protect human health and the environment are achieved at the Site. Specific DQOs will be provided in the various investigation and closure documents prepared for the Site.

- What are the soils and groundwater background concentrations for metals, radionuclides, and other anthropogenic contaminants (contaminants that are generally present regionally due to non-site related human activities)?
- Are human health and ecological risks adversely impacted in off-site areas due to transport of contaminants by wind and surface water?
- Have sediments at the bottom of the Las Vegas Wash been impacted by Site activities such that acceptable human health and ecological risks have been exceeded?
- Are human health risks for on-site soils for future land uses (residential, commercial, recreational, and construction) acceptable?
- Are human health and ecological risks associated with groundwater in the Upper Zone acceptable?
- Does groundwater in the Middle and Deep Zones adversely impact human health and ecological risks?
- Do health risks associated with the Las Vegas Wash exceed acceptable standards for human health and ecological receptors at the point of reasonable maximum exposure (RME) as a result of contaminants migrating from the Site?
- Will groundwater rise and discharge at the ground surface on-site and down gradient after development and if so, will it present a health risk to future human and ecological receptors?
- Will residual concentrations of contaminants in the vadose zone leach to groundwater after development and present a risk to human and ecological receptors?
- Do residual concentrations of Site-related contaminants pose unacceptable risks to exposed ecological receptors of concern in on-Site and off-Site media (soil, groundwater, surface water, air)?
- Are hot spots present that are of immediate concern to human health or ecological habitats?

- Are contamination and health risks associated with soils in the ditches higher than in the ponds?

- Will future residents that move in after portions of the Site are remediated be adversely impacted by other portions of the Site that are not remediated?

The quality of analytical data can be assessed through the evaluation of data quality indicators (DQIs). DQIs serve as the basis for assessing the precision, accuracy, representativeness, comparability, and completeness (PARCC) of a particular data set. DQIs are both quantitative and qualitative measurements of the analytical data, as evaluated through the process of data review and validation.

A7.1 Precision

Precision measures the reproducibility of repetitive measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the sample process under similar conditions.

Analytical precision is a measurement of the variability associated with duplicate or replicate analyses of the same sample in the laboratory, and is determined by analysis of laboratory control samples (LCS), such as LCS duplicates (LCSD), matrix spike duplicates (MSD), or sample duplicates. If the recoveries of analytes in the specified control samples are within control limits set forth by the laboratory, then precision is considered to be acceptable.

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

The precision of duplicate results is assessed by calculating the relative percent difference (RPD) between the duplicate measurements. If the RPD for laboratory~~-~~derived duplicate samples exceeds ~~30 percent for organic analytes, or~~ 20 percent for inorganic analytes, data will be qualified as described in the applicable validation procedure (USEPA ~~1999 and~~ 2004a). There are no criteria for organic laboratory duplicate precision because typically laboratories do not analyze laboratory duplicates for organic analyses.

According to the USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA 2004a), data are not qualified on the basis of field duplicate

imprecision. However, a control criterion for an RPD for field duplicate samples will~~analysis results may~~ be 50 percent for this project. Qualification of sample~~used in conjunction with historical or other mitigating~~ data is to be as described in SOP-40 (BRC, ERM~~support field decisions~~ and MWH 2007), similar to the~~may warrant~~ qualification of samples based on laboratory duplicates.~~if aberrant results between primary and duplicate field samples are reported.~~ The RPD is calculated as follows:

$$RPD\,(\%) = \left[\frac{S - D}{\left(\frac{S + D}{2}\right)}\right] \times 100$$

where S the concentration of the original sample, and D is the concentration of the duplicate sample.

A7.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random (variability due to imprecision) and systematic error. It reflects the total error associated with a measurement. A measurement is accurate when the value reported does not significantly differ from the true value or known concentration of the spike or standard.

Accuracy of laboratory analyses will be assessed by LCS, surrogate standards (for organic analytical methods), matrix spikes, and initial and continuing calibration of instruments. Laboratory accuracy is expressed as the percent recovery (%R). Statistically derived laboratory accuracy limits will be included with each laboratory report. If the %R is determined to be outside of acceptance criteria, data will be qualified according to SOP-40 (BRC, ERM and MWH 2007)~~as estimated~~ and the direction of the bias noted in the data validation memoranda. ~~Should recoveries fall below those specified in the data validation guidelines (USEPA 1999 and 2004a), or one-half the accepted lower recovery limit for any analysis not listed in the guidelines, the associated data will be considered rejected.~~ The calculation of %R is provided below:

$$\%R = 100 \times \frac{X_s - X}{T}$$

where X_s is the measured value of the spiked sample, X is the measured value of the unspiked sample, and T is the true value of the spike solution added.

Field accuracy will be assessed through analysis of field equipment blanks and trip blanks. Analysis of blanks will monitor errors associated with the sampling process, field conditions, sample preservation, and sample handling. The DQO for field equipment and trip blanks is that all values are less than the reporting limit for each target constituent. If contamination is identified in the field equipment or trip blanks, data will be qualified in the associated samples as described in the guidelines used for validation (USEPA 1999 and 2004a) and as described in SOP-40 (BRC, ERM and MWH 2007). Contamination of the samples can occur as a result of field or laboratory operations, and detections due to such contamination are not representative of actual Site conditions.

A7.3 Representativeness

Representativeness is the degree to which data accurately and precisely represent characteristics of a population, process condition, or environmental condition of the media sampled. Representativeness of data collection is addressed by using appropriate and consistently established sampling and analytical methods. The SAPs/FSPs will address representativeness by specifying sufficient and proper numbers and locations of samples; incorporating appropriate sampling methodologies; specifying proper sample collection techniques and decontamination procedures; selecting appropriate laboratory methods to prepare and analyze samples; and establishing proper field and laboratory QA/QC procedures, as outlined in this QAPP. The design of any data collection must also consider the representativeness of site conditions in terms of lithologic, physical, and chemical parameters.

A7.4 Completeness

Completeness is a measure of the relative number of usable data points that meet all the acceptance criteria for accuracy, precision, and any other criterion required by the specific analytical methods used. Based on USEPA guidance, completeness goals are expressed as a percentage (USEPA 2002b).

The number of valid results divided by the number of possible results, expressed as a percentage, determines the completeness of the data set. The objective for completeness is at minimum 90 percent of the total data set. Discretionary re-sampling may be performed at the direction of BRC and NDEP, should a lack of data for a given chemical or sample location be critical to the decision making process.

The formula for calculation of completeness is presented as follows:

$$\%Completeness = 100 \times \frac{Number\ of\ Valid\ Results}{Number\ of\ Expected\ Results}$$

Qualitatively, the completeness goal provides the necessary information to support project decisions. Completeness is achieved when both the quantitative and qualitative objectives are met for this parameter (*i.e.*, project decisions can be made using the data set).

A7.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability is a qualitative, not quantitative, measurement. Comparability is assessed by reviewing results, or procedures, for data that do not agree with expected results. Strict adherence to QA/QC and defined project procedures will produce more comparable data.

Comparability is an expression of confidence with which one data set can be compared to another. The objective of comparability is to ensure that data developed during the investigation are comparable to Site knowledge and adequately address applicable criteria or standards established by the USEPA and NDEP. This QAPP addresses comparability by specifying laboratory methods that are consistent with the current standards of practice, as approved by the USEPA and NDEP and by adhering to strict QA/QC procedures. Field methods are discussed in the FSSOP~~field SOPs~~ (BRC, ERM and MWH 2007~~2006, in preparation~~) and adhere to practices consistent with the policies of the NDEP.

A8. SPECIAL TRAINING/CERTIFICATIONS

All field personnel will be certified as required by the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard provided in 29 CFR 1910.120 (USEPA 1990), which sets forth training requirements for hazardous waste clean up, treatment, and emergency response for field activities. HAZWOPER training includes both a one-time 40-hour training and annual eight-hour refresher courses to maintain current certification. All field activities will be supervised by a State of Nevada C.E.M. All respective laboratories performing analytical testing of Site samples will be certified to do so by NDEP. It should be noted that the Site has a number of unique analytes and a Nevada-certified laboratory may not be available for some of the analyses. These analytes will be discussed with NDEP and handled on a case-by-case basis.

All statistical analyses, geostatistics, human health and ecological risk assessments, and hydrologic and hydrogeologic modeling must be performed by individuals well versed in these

fields. Such individuals shall have an undergraduate degree in the appropriate discipline or equivalent. Records of certification will be maintained with the QA Manager's project file.

A9. DOCUMENTATION AND RECORDS

Records will be maintained documenting all activities and data related to sample collection and laboratory analyses. Results of data verification and validation activities will also be documented. Procedures for documenting these activities are described in this section.

Each SAP/FSP, this QAPP, and the Health and Safety Plan (HSP; BRC and MWH 2005) will be provided to every project participant listed in Section A4. Any revisions or amendments to any of these documents will also be provided to these individuals. This QAPP will be reviewed and updated on an annual basis throughout the duration of the project. Any changes to the document must be approved by all signatory stakeholders and an updated QAPP will be provided to all project participants.

A9.1 Field Documentation

All records of field operations will be maintained in the project file in BRC's Henderson, Nevada office. This includes any field logs, sampling records, sample chain-of-custody, laboratory reports, maps, drawings, and data compilations and statistical evaluations performed as part of any sampling and analysis program. The following field records will be maintained throughout the duration of sampling activities:

- Field log books
- Field data forms
- Sample description forms
- Soil core logs
- Sample labels
- Sample chain-of-custody forms
- ~~Custody labels~~
- Photographic documentation.

The content and use of these documents will be described in each SAP/FSP.

The following reports will be completed, as necessary, to document an audit or a deviation from a SAP/FSP or this QAPP:

- Corrective action reports will be used, as necessary, to document any problems encountered during field activities and corrective actions taken.
- Field change request forms will be used, as necessary, to document the need for a procedural change or a sample location change.
- System and performance audit reports will be used, as necessary, to document review or audit of field sampling activities.

The representative investigation consultant will ensure that the field team receives the final, approved version of each SAP/FSP and this QAPP prior to the initiation of field activities.

A9.2 Laboratory Documentation

All activities and results related to sample analysis will be documented at each laboratory. Internal laboratory documentation procedures are described in the Laboratory Quality Assurance Plans (Appendix B).

Each laboratory will provide a data package for each sample delivery group or analysis batch that is comparable in content to a full Contract Laboratory Program (CLP) package. The format of the data may differ from CLP requirements. Each data package will contain all information required for a complete QA review, including the following:

- A cover letter discussing analytical procedures and any difficulties that were encountered.
- A case narrative referencing or describing the procedures used and discussing any analytical problems and deviations from SOPs and this QAPP.
- Chain-of-custody and cooler receipt forms.
- A summary of analyte concentrations ~~(to two significant figures, unless otherwise justified)~~, MRLs, and method detection limits (MDLs).

- Laboratory data qualifier codes appended to analyte concentrations, as appropriate, and a summary of code definitions.
- Sample preparation and cleanup logs.
- Instrument tuning check data.
- Initial and continuing calibration data, including instrument printouts and quantification summaries, for all analytes.
- Results for method and calibration blanks.
- Summary forms with results for all QA/QC checks, including but not limited to surrogate spikes, internal standards, LCS, matrix spike samples, MSD samples, and laboratory duplicate samples.
- Instrument data quantification reports for all analyses and samples.
- Copies of all laboratory worksheets and standards preparation logs.

The laboratory is required to maintain all records, calculations, raw data, and magnetic back up tapes for all sample analyses for a period of five years. Unless otherwise notified, samples and sample extracts will be retained by the laboratory for a minimum of 30 days after a written report is issued to BRC or designee. The laboratory will dispose of excess or unused samples in a manner consistent with appropriate government regulations.

Data will be delivered in both hard-copy and electronic format to the BRC QA Manager, who will be responsible for oversight of data verification and validation, and for archiving the final data and data quality reports in the project file. BRC will maintain data packages and electronic data deliverables (EDDs) for chemical analyses. All data will be copied to NDEP both in the form of laboratory reports and EDDs using EarthSoft's EQuIS® data system format.

A9.3 Data Quality Documentation

Data validation reports will be prepared by the contracted validation firm and provided to the BRC QA Manager. Results of the validation reports will be summarized in the applicable site characterization summary report for each sampling event. Any limitations to the usability of the data will also be discussed in this report.

All electronic database entries provided by each laboratory will be verified against the validated hard-copy data in the data package. All changes to the database will be documented in an electronic log file that automatically enters a current time stamp when opened and allows the data editor to enter notes about changes to the database. Any data tables prepared from the database will include all qualifiers that were applied by the laboratories and during data validation, unless otherwise requested.

B DATA GENERATION AND ACQUISITION

B1. SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)

A number of field investigation and remediation activities are anticipated for the project. Environmental sampling includes the collection of surface water, sediment, soil, porewater, and groundwater samples; several geophysical and water quality surveys may also be performed. Project sampling and field documentation procedures, as well as the objectives of each sample task, are detailed in each respective SAP/FSP. The purpose of each SAP/FSP is to ensure that samples are collected, handled, and documented correctly prior to analysis. Each SAP/FSP will include, at a minimum, the following information:

- Description of the field activities that will take place, including a discussion of purpose and objectives.
- Preparation and mobilization procedures for the particular field activity, including permitting requirements and utility clearance.
- Complete, detailed account of all anticipated field activities (*e.g.*, soil boring locations and procedures, soil sample collection, well installation, groundwater sampling).
- Soil sample and monitoring well nomenclature.
- Analytical methods, QA/QC procedures, and field equipment and field instrument operations and reporting requirements.

B2. SAMPLING METHODS

The defensibility of data is dependent on the use of well defined, accepted sampling procedures. Sampling method details not provided here are included in the respective SAPs/FSPs and SOPs. Collection of environmental samples of high integrity is important to the quality of chemical data generated. Sampling SOPs for field activities have been developed and are contained in the

project FSSOP manual (BRC, ERM and MWH 2007~~2006, in preparation~~). The procedures are discussed in each SAP/FSP, along with additional procedures necessary to complete the proposed field program.

B3. SAMPLE HANDLING AND CUSTODY

Detailed procedures for sample identification, handling, documentation, custody, and ultimate disposal are presented in each SAP/FSP. The following provides a brief discussion of these procedures.

B3.1 Sample Containers, Preservation, and Holding Times

Table 3 lists the required sample containers, preservatives, and recommended maximum holding times for samples. Sample containers provided by the laboratory for this project will have been~~be~~ purchased commercially by the laboratory from I-Chem, Eagle Pitcher, or other equivalent source.

B3.2 Sample Handling and Storage

In the field, each sample container will be marked with identifying information, such as the sampling location number, date and time of sample collection, analysis required, depth of sample, preservative (if any), and other identifying information, as applicable to the particular sampling. Sample labels will be filled out with indelible ink. All sample containers will be wiped with paper towels and securely packed in a chilled cooler with ice, in preparation for delivery to the laboratory. The ice will be bagged in zip-top style~~self-sealing~~ plastic bags to prevent water leakage.

Upon receipt of the samples, the laboratory will immediately notify the Field Manager if conditions or problems are identified that require immediate resolution. Such conditions may include: container breakage, missing or improper chain-of-custody, exceeded holding times, missing or illegible sample labeling, or temperature excursions.

B3.3 Sample Custody

For each sample submitted to the laboratory for analysis, an entry will be made on a chain-of-custody form supplied by the laboratory. The information to be recorded includes the sampling date and time, sample identification number, matrix type, requested analyses and methods,

preservatives, and the sampler's name. Sampling team members will maintain custody of the samples until they are relinquished to laboratory personnel or a professional courier service.

Custody is described as:

- The sample is in one's actual physical possession;
- The sample is in one's clear field of view after being in one's physical possession;
- The sample is in one's physical possession and is then locked up in a secure, tamper-proof container; or
- The sample is kept in a secured area that can be accessed by authorized personnel only.

The chain-of-custody form will accompany the samples from the time of collection until received by the laboratory. Each party in possession of the samples (except the professional courier service) will sign the chain-of-custody form to signify receipt. The chain-of-custody form will be placed in a plastic bag and shipped with samples inside the cooler. After samples have been placed in the cooler, packed for shipment, and completed with chain-of-custody documentation, the cooler will be sealed with packing tape and affixed with a custody seal. The seal will be either a laboratory-provided custody seal or similar label that is completed with the samplers' signature and affixed across the cooler lid and base to provide evidence that the cooler was not opened during transit. The custody seal should be taped over with packing tape such that it cannot be removed without being destroyed. This procedure will not be required for coolers that are hand delivered to the analytical laboratory by the sampler.

The laboratory will provide a copy of the original, completed custody form with the analytical report of results to the entity specified on the chain-of-custody form. Upon receipt, the laboratory will inspect the condition of the sample containers and report all relevant information on the chain-of-custody or similar form, such as an internal laboratory sample log-in form.

B4. ANALYTICAL METHODS

Laboratory methods to be used are consistent with requirements provided in SW-846 (USEPA 2004b), USEPA protocols and guidelines, and other established and widely accepted protocols. Modifications will be made to these methods, as necessary and technically feasible, to improve MRLs. The current analyte list, based on site-related chemicals (SRCs) identified for the project, and analytical methods to be used for this project are listed in Table 4. The total number of

samples and the analyses that will be conducted on each sample will be indicated in each SAP/FSP.

Specific analytical method procedures are detailed in the laboratory QA Plan and SOPs of the selected laboratory. These documents may be reviewed by project QA staff during laboratory or data audits to ensure that project specifications are met. ~~The analyte list for the project has not been finalized prior to preparation of this QAPP. Therefore, the analytical methods will be updated in subsequent versions of this QAPP. The analytes and analytical methods identified in Table 4 are those identified in the January 9, 2006 SRC list.~~

B4.1 Internal Standards

Internal standards are measured amounts of method-specified compounds added after preparation or extraction of a sample. Internal standards are added to samples, controls, and blanks, in accordance with method requirements, to identify column injection losses, purging losses, or viscosity effects.

Acceptance limits for internal standard recoveries are set forth in the applicable method. If the internal standard recovery falls outside of acceptance criteria, the instrument will be checked for malfunction and reanalysis of the sample will be performed after any problems are resolved.

B4.2 Retention Time Windows

Retention time windows will be established as described in SW-846 Method 8000A (USEPA 2004b) for applicable analyses of organic compounds. Retention time windows are used for qualitative identification of analytes and are calculated based on multiple, replicated analyses of a respective standard.

Retention times will be checked on a daily basis. Acceptance criteria for retention time windows are established in the referenced method. If the retention time falls outside the respective window, corrective action such as recalibration and reanalysis will be taken to correct the problem. The instrument must be re-calibrated after any retention time window failure and the affected samples must be reanalyzed.

B4.3 Method Detection Limits

The MDL is the minimum concentration of an analyte or compound that can be measured and reported with 99 percent confidence that the concentration is greater than zero. MDLs are

established for each method, matrix, and analyte, and for each instrument used to analyze project samples. ~~Laboratory~~ MDLs are ~~included in Table 4.~~

~~MDLs are~~ derived using the procedures described in 40 CFR 136 Appendix B (USEPA 1990). USEPA requires that MDLs be established on an annual basis. The laboratory must use current MDLs to establish the laboratory reporting limits used for reporting purposes. The laboratories must be able to meet acceptable analysis-specific MDLs for project work.

B4.4 Special Quantitation Methods for Short-Lived Radionuclides

For several "short-lived" radionuclides compounds indicated in Table 4, the basis for quantitation will be "back-quantitation" from parent radionuclides. This specific group of exceptional radionuclides represents those compounds with relatively short half-lives ranging from seconds to days. It is recognized that for these radionuclides of interest any measured concentration in the sample may not reflect the predicted presence.

B5. QUALITY CONTROL

This section presents QC requirements relevant to analysis of environmental samples that will be followed during all project analytical activities. The purpose of the QC program is to produce data of known quality that satisfy the project objectives and that meet or exceed the requirements of the standard methods of analysis. This program provides a mechanism for ongoing control and evaluation of data quality measurements through the use of QC materials.

B5.1 Quality Control Procedures

The chemical data collected as part of any project sampling effort will be used to determine the nature and extent of contamination, and potentially to support further evaluations, such as risk assessment. Therefore, it is critical that the chemical data be of the highest confidence and quality. Consequently, QA/QC procedures will be strictly adhered to. These procedures include:

- Adherence to established protocols for field sampling, decontamination procedures, and analytical methods;
- Collection and laboratory analysis of appropriate field equipment and trip blanks to monitor for possible contamination of samples in the field or the laboratory;

- Collection and laboratory analysis of matrix spike, MSD, and field duplicate samples to evaluate precision and accuracy; and
- Attainment of both qualitative and quantitative completeness goals.

B5.1.1 Equipment Decontamination

Non-dedicated equipment will be decontaminated before and after each sample is collected. The equipment will be washed in a non-phosphate detergent and potable water, rinsed in potable water, and then double rinsed in contaminant-free reagent water. The specific methodologies to maximize proper decontamination of non-dedicated sampling equipment are presented in each applicable sampling SOP (BRC, ERM and MWH 2007~~2006, in preparation~~).

B5.1.2 Standards and Reagents

Standards used for calibration and reagents to prepare samples will be certified by the National Institute of Standards and Technology (NIST), USEPA, or other equivalent source. The standards and reagents will be within their expiration dates. The expiration date will be established by the manufacturer, or based on chemical stability, the possibility of contamination, and environmental and storage conditions. Standards and reagents will be labeled with expiration dates, and will reference primary standard sources, if applicable. Expired standards or reagents will be discarded.

B5.1.3 Supplies

All supplies will be inspected prior to their use in the field or laboratory. The descriptions for sample collection and analysis contained in the methods will be used as a guideline for establishing the acceptance criteria for supplies. A current inventory and appropriate storage system for these materials will ensure their integrity prior to use. Efficiency and purity of supplies will be monitored through the use of standards and blank samples.

B5.1.4 Holding Time Compliance

Sample preparation and analysis will be completed within the required method holding times (Table 3). Holding time begins at the time of sample collection. If an analysis is performed on a sample that has exceeded its holding time, the associated results will be qualified as described in the applicable validation procedure (USEPA 1999 and 2004a). The following definitions of extraction and analysis compliance are used to assess holding times:

- Preparation or Extraction Completion: Completion of the sample preparation process as described in the applicable method, prior to any necessary extract cleanup.

- Analysis Completion: Completion of all analytical runs, including dilutions, second-column confirmations, and any required re-analyses.

The laboratory will notify the BRC QA Manager upon exceeding holding times for any requested sample analysis. The laboratory will not perform any analysis outside of method recommended holding times without written consent.

B5.1.5 Preventive Maintenance

The Field Manager is responsible for documenting the maintenance of all field equipment prescribed in the manufacturer's specifications. Field personnel will perform scheduled maintenance as appropriate or required by the equipment manufacturer. Procedures specific to the calibration, use, and maintenance of field equipment will be presented in the respective sampling plan. The analytical laboratory is responsible for all laboratory equipment calibration and maintenance as described in their laboratory QA Plan. Subcontractors are responsible for maintenance of all equipment needed to carry out subcontracted duties.

B5.1.6 Special Training and Certifications

All field personnel will be certified as required by the HAZWOPER standard provided in 29 CFR 1910.120 (USEPA 1990), which sets forth the training requirements for hazardous waste clean-up, treatment, and emergency response for field activities. HAZWOPER training includes both a one-time 40-hour training and annual eight-hour refresher courses to maintain current certification. All field activities will be supervised by a C.E.M. in the State of Nevada. All respective laboratories performing analytical testing of Site samples will be certified to do so by NDEP.

B5.2 Quality Assurance and Quality Control (QA/QC) Samples

The purpose of the QA/QC program is to produce data of known quality that satisfy the project objectives and that meet or exceed the requirements of the standard methods of analysis. This program provides a mechanism for ongoing control and evaluation of data quality measurements through the use of QC materials. QA/QC samples will be collected as part of the overall QA/QC program.

B5.2.1 Laboratory Reagent Blanks

A laboratory reagent blank is contaminant-free reagent water that is prepared and analyzed by the laboratory in the same manner as an environmental sample. Analysis of the reagent blank indicates potential sources of contamination from laboratory procedures (*e.g.*, contaminated reagents, improperly cleaned laboratory equipment, or persistent contamination due to presence of certain compounds in the ambient laboratory air). A reagent blank will be analyzed once per every 20 samples, or at least once each day for each method used by the laboratory for that day.

B5.2.2 Field Equipment Blanks

A field equipment blank is a sample that is prepared in the field by pouring contaminant-free reagent water into previously cleaned sampling equipment. The water is then prepared and analyzed in the same manner as an environmental sample. Field equipment blanks are typically submitted blind (given a fictitious name so that the laboratory will not recognize it as a blank). The field equipment blank gives an indication of contamination from field procedures (*e.g.*, improperly cleaned sampling equipment or cross-contamination). Field equipment blanks will be collected at a minimum frequency of at least one per 20 samples, or five percent of primary field samples, when non-dedicated equipment is utilized. Field equipment blanks will be prepared and analyzed for the same analysis suite as the associated primary samples collected.

Decontamination procedures will be used in association with all non-dedicated sample collection equipment prior to collection of field equipment blank samples. For *in-situ* water sampling, non-dedicated field sample collection equipment will be limited to the sampling device of the selected equipment that acts as a direct sample collection device. For sampling of groundwater monitoring wells, non-dedicated field sample collection equipment will be limited to the pump that is used for purging of groundwater wells. For soil sampling, non-dedicated field sample collection equipment includes the specific device used for obtaining the sample. Various types of soil sampling devices are described in the applicable SOP (BRC, ERM and MWH 2007~~2006, in preparation~~).

B5.2.3 Trip Blanks

Trip blanks monitor for contamination due to handling, transport, cross contamination from other samples during storage, or laboratory contamination. Positive detections in the trip blank sample results may indicate contamination of samples during the transport or handling process. Sample detections at similar concentrations as those reported in associated trip blank samples are

considered suspect. These results may be qualified as non-detected during the data validation. In the event that detections of target analytes, other than USEPA-identified common laboratory contaminants, are consistently reported in trip blank samples, adjustments to packing and handling may be implemented.

Trip blanks serve as a mechanism of control for sample bottle preparation, blank water quality, and sample handling. They are generally submitted to the laboratory for analysis of VOCs and only accompany sample shipments where environmental samples are to be analyzed for VOCs.

The trip blank consists of a VOC sample vial filled in the laboratory with American Society of Testing and Materials (ASTM) Type II reagent-grade water. The trip blank accompanies the empty sample bottles to the site and returns with the collected field samples in an effort to simulate sample handling and transportation conditions. Trip blanks are opened only by laboratory personnel. One trip blank will be included in each shipping container transporting samples for VOCs analysis. Examples of potential sources of contamination in trip blanks include the following:

- Laboratory reagent water;
- Sample containers;
- Cross-contamination during shipment;
- Ambient air, or contact with analytical instrumentation during preparation and analysis at the laboratory; and
- Laboratory reagents used in analytical procedures.

If compounds are detected in the trip blank, the appropriate validation flag, as described in the applicable validation procedure (USEPA 1999) and SOP-40 (BRC, ERM and MWH 2007), will be applied to the associated sample results. Other issues affecting the use and integrity of trip blanks include the following:

- Handling: Trip blanks may be held on the Site for a maximum of one week. The temperature of the trip blanks during storage will be maintained at 4 °C + 2 °C. A temperature blank will be included in the cooler to verify that the temperature requirement is not exceeded. Expired trip blanks will be returned to the laboratory for disposal.

- Holding Time: The holding time clock for analysis of trip blanks begins at the time of sample collection of the oldest sample in the set.

B5.2.4 Matrix Spike Samples

Matrix spikes are performed by the analytical laboratory to evaluate the efficiency of the sample extraction and analysis procedures, and are necessary because interference from the sample matrix 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 target compounds to a sample. The sample 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. Matrix spike recoveries are reviewed to check that they are within acceptable range. However, the acceptable ranges vary widely with both sample matrix and analytical method.

Matrix spikes and MSDs will be analyzed by the laboratory at a frequency of at least one per 20, or five percent of the primary field samples, whichever is greater. Typically, matrix spikes are performed in duplicate in order to evaluate the precision of the procedures as well as the accuracy. Precision objectives (represented by agreement between matrix spike and MSD recoveries) and accuracy objectives (represented by matrix spike recovery results) are based on statistically generated limits established annually by the analytical laboratory. It is important to note that these objectives are to be viewed as goals, not as criteria. If matrix bias is suspected, the associated data will be qualified and the direction of the bias indicated in the data validation report.

B5.2.5 Field Duplicate Samples

Soil and water field duplicate samples will be collected and analyzed to evaluate sampling and analytical precision. Field duplicates are collected and analyzed in the same manner as the primary samples. Agreement between duplicate sample results will indicate good sampling and analytical precision. Specific locations will be designated for collection of field duplicates prior to the start of field activities. Field duplicates will be collected at a frequency of 10 percent, or one per 10 samples of the primary samples collected. The duplicate sample will be analyzed for all laboratory analyses requested for the primary sample collected. The precision goal for field duplicate analyses will be plus or minus 50 percent RPD for solid and aqueous samples.

B5.2.6 Performance Evaluation Samples

Double blind performance evaluation (PE) samples may be submitted to the analytical laboratory at any time. These samples will be of both soil and water matrices and are used to assess the accuracy of analytical procedures employed by the laboratory. However, because laboratories are licensed by the State of Nevada as certified testing laboratories,[1] and participate in an approved Performance Evaluation Program, no PE samples are anticipated for the project.

B6. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Analytical instrument testing, inspection, maintenance, setup, and calibration will be conducted by each laboratory in accordance with the requirements identified in the laboratory SOPs and manufacturer instructions. Instrument maintenance and repair will be documented in maintenance logs or record books.

Audit programs are established and will be directed by the project QA staff to ensure that field and laboratory activities are performed in compliance with project controlling documents. This section describes responsibilities, requirements, and methods for scheduling, conducting and documenting audits of field and laboratory activities.

B6.1 Field Audits

Field audits focus on the appropriateness of personnel assignments and expertise, availability of field equipment, adherence to project controlling documents for sample collection and identification, sample handling and transport, use of QA samples, chain of custody procedures, equipment decontamination and documentation. Field audits are not required, but will be performed in the event significant discrepancies are identified that warrant evaluation of field practices. NDEP will be consulted prior to the performance of any field audits for the project.

B6.2 Laboratory Audits

Laboratory audits include reviews of sample handling procedures, internal sample tracking, SOPs, analytical data documentation, QA/QC protocols, and data reporting. Because selected

[1] It should be noted that the Site has a number of unique analytes and a Nevada-certified laboratory may not be available for some of the analyses. These analytes will be discussed with NDEP and handled on a case-by-case basis.

laboratories are licensed by the State of Nevada as certified testing laboratories and participate in an approved Performance Evaluation Program, no laboratory audits will be performed.

B6.3 Data Audits

Data audits will be performed on analytical results received from the laboratories. These audits will be accomplished through a process of data validation, as described in Section D1, or may involve a more detailed review of laboratory analytical records. Data audits require the laboratory to submit complete raw data files for validation and verification. Professional chemists will perform a review of the data as described in Section D1. This level of validation consists of a complete and comprehensive review of sample data and results of QC samples to assess if these data are consistent with method requirements. Upon request, the laboratory will make available all supporting documentation, or associated magnetic media, in a timely fashion.

B6.4 Scheduling

Audits will be scheduled such that field and laboratory activities are adequately monitored, or in the event discrepancies are identified. The overall frequency of audits conducted for these activities will be based on the importance and duration of work, as well as significant changes in project scope or personnel.

B6.5 Reports to Management and Responsibilities

Upon completion of any audit, the auditor will submit to the Project Manager a report or memorandum describing any problems or deficiencies identified during the audit. It is the responsibility of the Project Manager to determine if the deviations will result in any adverse effect on the project conclusions. If it is determined that corrective action is necessary, the procedures outlined in Section C1 will be followed.

B7. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Analytical instruments will be calibrated in accordance with the procedures specified in the applicable method. All analytes that are reported shall be present in the initial and continuing calibrations, and these calibrations must meet the acceptance criteria specified in the reference method. Records of standard preparation and instrument calibration will be maintained. Records shall unambiguously trace the preparation of standards and their use in calibration and

quantitation of sample results. Calibration records will be traceable to standard materials as described in Section B5.1.2.

At the onset of analysis, instrument calibrations will be checked using all of the analytes of interest. At a minimum, calibration criteria will satisfy method requirements. Analyte concentrations can be determined with either calibration curves or response factors, as defined in the method. Guidance provided in SW-846 (USEPA 2004b), or applicable method, will be considered to determine appropriate evaluation procedures.

All calibration standards will be obtained from either the USEPA repository or a commercial vendor, and the laboratory will maintain traceability to the NIST. Stock standards will be used to make intermediate standards and calibration standards. Special attention will be given to expiration dating, proper labeling, proper refrigeration, and prevention of contamination. Documentation relating to the receipt, mixing, and use of standards will be recorded in a laboratory log book.

B8. INSPECTION/ACCEPTANCE FOR SUPPLIES AND CONSUMABLES

The quality of supplies and consumables used during sample collection and laboratory analysis can affect the quality of the project data. All equipment that comes into contact with the samples and extracts must be sufficiently clean to prevent detectable contamination, and the analyte concentrations must be accurate in all standards used for calibration and QC purposes. All supplies and consumables used for this investigation will be obtained through an appropriate supplier and will meet any applicable supply-specific requirements. All supplies and consumables will be inspected prior to use. Any product that does not meet applicable requirements will be returned to the supplier for replacement or will be discarded. Supply specific requirements include, but are not limited to, the following:

- Blank water will be certified analyte-free and analytical results will be provided for each lot.
- Decontamination and preservation chemicals will be ultra-pure grade or pesticide grade, as applicable. Certifications will be obtained from the supplier.
- Sampling equipment will be constructed of approved materials.

During sample collection, solvents of appropriate, documented purity will be used for decontamination. Solvent containers will be dated and initialed when they are opened. The

quality of laboratory water used for decontamination will be documented at the laboratory that provides that water. As discussed in Section B3, cleaned and documented sample containers will be provided by the laboratories. All containers will be visually inspected prior to use, and any suspect containers will be discarded.

Reagents of appropriate purity and suitably cleaned laboratory equipment will also be used for all stages of laboratory analyses. Details for acceptance requirements for supplies and consumables at the laboratories are provided in the laboratory SOPs and Quality Assurance Plans (Appendix B). All supplies will be obtained from reputable suppliers with appropriate documentation or certification. Supplies will be inspected to confirm that they meet use requirements, and certification records will be retained by BRC (*i.e.*, for supplies used in the field) or the laboratories.

B9. NON-DIRECT MEASUREMENTS

There are several non-direct measurements that may be used during various investigations. These include historical data for various media, and environmental fate and transport modeling. The details regarding the evaluation of these measurements and how they will be used are described in detail in the *BRC Closure Plan* (BRC, ERM, and DBS&A 2007). ~~2006, in preparation).~~ Existing chemical data from previous investigations may be used. All historical data will be reviewed for QA and data validation prior to use.

B10. DATA MANAGEMENT

This section presents the plan for data management, data review, and data reporting relevant to the data produced during all project analytical activities. This plan ensures that data are correct, readily available, and of the quality necessary to support the DQOs described in this QAPP. The project Data Management Plan is presented in Appendix C.

B10.1 Field Data

Data measured by field instruments will be recorded in field notebooks, laptop computers, and/or on required field forms. Examples of field documentation forms are included in the task-specific work plan and will be used during all ~~groundwater~~ sample collection efforts. Units of measure for field analyses are identified on the field forms. The field data will be reviewed by the Field Manager and/or Task Manager to evaluate completeness of the field records and appropriateness of the field methods employed. All field records will be retained in the project files.

B10.2 Laboratory Data

Analytical data will contain the necessary sample results and QC data to evaluate the DQOs defined for the project. Documentation requirements for laboratory data are defined in USEPA Region 9 *Draft Laboratory Documentation Requirements for Data Validation* (USEPA 1997). Laboratory reports will be consistent with USEPA Level IV documentation for 100 percent of the samples analyzed by the laboratory, and will include the following data and summary forms:

- Narrative, cross-reference, chain of custody, and method references;
- Analytical results;
- Surrogate recoveries (as applicable);
- Blank results;
- LCS recoveries;
- Duplicate sample results or duplicate spike recoveries;
- Sample spike recoveries;
- Summary of internal standards recoveries;
- Summary of initial and continuing calibration standards recoveries and raw data;
- Summary of initial and calibration blank concentrations and raw data;
- Analytical run logs;
- Sample preparation logs;
- Standard preparation logs; and
- Instrument raw data for the reported sample set.

B10.3 Electronic Data Management

ERM~~MWH~~ will maintain a project database for chemistry data. The BRC~~MWH~~ Data Manager is responsible for the maintenance of the project chemistry database. Each laboratory will provide analytical data in electronic format for storage in the project analytical database. The BRC~~MWH~~

Data Manager will amend the project database with each new set of data provided by the laboratory, perform accuracy checks between the hardcopy and electronic data reports, and maintain any data qualifiers resulting from data validation activities.

The project database is supported by EarthSoft's EQuIS® Data Management System. The relational database program is written in Visual Basic and uses the Microsoft Access engine. Sample, test, and result data are electronically and manually imported directly into the EQuIS® database. Once data have been entered and all QC reviews have been performed, queries can be generated and data interfaced with industry-standard products for visualization, graphing, and reporting. Specific details for data management are provided in the Data Management Plan in Appendix C.

B10.4 File Storage

Data collected as part of any activities conducted at the Site will be stored in a central file system in the respective contractor's offices. In accordance with their own QAPP, the laboratory will also maintain a filing system for documents necessary to support the analytical processes. Archiving of project data is discussed in the Data Management Plan (Appendix C).

B10.5 Reporting

Reports of any data resulting from a given investigation or subsequent evaluations will be provided in accordance with the task-specific work plan, as approved by NDEP. The reports may contain data, evaluations, and conclusions to meet the purpose of the report. The reporting schedule will be provided in the work plan.

C ASSESSMENT AND OVERSIGHT

A formal chain of communication has been established for this project to optimize the flow of information and to keep the project team apprised of activities and events. The field team will stay in close verbal contact with the BRC Project Manager during all phases of the project. These individuals will, in turn, keep NDEP representatives informed of any significant developments in the field or at the laboratories.

C1. ASSESSMENTS AND RESPONSE ACTIONS

Corrective actions will be initiated whenever DQIs suggest that DQOs have not been met. Corrective actions will begin with identifying the source of the problem. Potential problem sources include failure to adhere to method procedures, improper data reduction, equipment malfunctions, or systemic contamination. The first level of responsibility for identifying the problems and initiating corrective action lies with the analyst/field personnel. The second level of responsibility lies with any person reviewing the data. Corrective actions may include more intensive staff training, equipment repair followed by a more intensive preventive maintenance program, or removal of the source of systemic contamination. Corrective action policies for laboratory procedures are discussed in the laboratory Quality Assurance Plans provided in Appendix B. Once resolved, any corrective action implemented will be fully documented and, if DQOs were not met, any samples in question will be recollected and/or reanalyzed using a properly functioning system.

C2. REPORTS TO MANAGEMENT

A field sampling report will be prepared and submitted to NDEP within 90 days of completing each type of sampling event and data review/validation. Field sampling reports will summarize field sampling activities, including sampling locations (maps), requested sample analyses, sample collection methods, and any deviations from the SAP/FSP and QAPP.

Data packages and EDDs will be prepared by the laboratory upon completion of analyses for each sample delivery group. The case narrative will include a description of any problems encountered, control limit exceedances, and rationale for any deviations from protocol. Copies of corrective action reports generated at the laboratory will also be included with the data package.

A data validation report will be prepared for each data package by the data validation firm. These reports and the validated data will be provided to the BRC QA Manager when validation is completed for each package. A summary of any significant data quality issues will be provided to USEPA with the data submittal for each sampling effort.

The laboratories will keep the BRC QA Manager apprised of their progress on a weekly basis. The laboratories will provide the following information:

- Inventory and status of samples held at the laboratory, in spreadsheet format by sample delivery group

- Summaries of out-of-control laboratory QC data and any corrective actions implemented
- Descriptions and justification for any significant changes in methodology or QA/QC procedures.

The laboratories have implemented routine systems of reporting non-conformance issues and their resolution. These procedures are described in the laboratory Quality Assurance Plans (Appendix B). Laboratory non-conformance issues will also be described in the applicable site characterization summary report for each sampling event if they affect the quality of the project data.

The status of field and laboratory activities will be provided to NDEP project managers on a routine basis. The following information will be included in this report:

- Actions taken
- Status of field and laboratory data
- Scheduled events for the following two months
- Problems encountered, anticipated delays, and solutions
- Documents and issues awaiting NDEP's response.

This report will be prepared by BRC and/or its consultants and will be supplied to NDEP by BRC Project Manager.

D DATA VALIDATION AND USABILITY

Data generated in the field and at the laboratories will be verified and validated according to criteria and procedures described in this section. Data quality and usability will be evaluated, and a discussion will be included in the applicable site characterization summary report for each sampling event.

D1. DATA REVIEW, VERIFICATION, AND VALIDATION

Guidance for data review and validation is provided in USEPA's National Functional Guidelines (USEPA 1999 and 2004a) and SOP-40 (BRC, ERM and MWH 2007). SOP-40 was designed to be consistent with and at least as rigorous as the National Functional Guidelines.~~)~~ These

guidance manuals provide direction for the data review and validation activities to be conducted for all data collection activities. All data will undergo a standard QC review, as described in this section. Should a more vigorous review be warranted for a specified data set, data validation will include a review of raw data submitted by the laboratory to verify instrument calibration, performance data, and recalculation~~recalculations~~ of sample results. At a minimum, 10 to 20 percent of the data will undergo validation consistent with the procedures described in the National Functional Guidelines and SOP-40.

Data validation criteria specified in SOP-40 (BRC, ERM and MWH 2007) for this project are derived from the National Functional Guidelines (USEPA 1999 and 2004a). The National Functional Guidelines provide specific data validation criteria that can be applied to the data type generated from an environmental~~a groundwater~~ investigation. Some data acquisition requirements may be less stringent; however, compliance in the above QC areas will assure useful data are obtained during any given sampling event.

Laboratory data will be reviewed for compliance with the applicable method and the quality of the data reported. To facilitate this data review, computerized data validation tools developed for EarthSoft's EQuIS® Data Management System will be employed. The following parameters summarize the specific criteria and scope of the standard data review:

- Data Completeness;
- Holding Times;
- Blanks;
- LCS;
- Matrix Spike/MSDs;
- Surrogates/Internal Standards (as applicable);
- Field QC Samples; and
- Compound Identification and Quantification.

The application of QC review criteria is a function of project-specific DQOs. The BRC QA Manager will determine if the DQOs for the analytical data have been met based on data that met and/or exceeded validation criteria. Results of the data validation review will be documented and

summarized together with the data. All resulting documentation will be maintained in the project files.

D1.1 Data Review

Data review involves verifying the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. Data that do not meet the acceptance criteria, such as accuracy, precision, and holding time, as described in this QAPP, will be qualified. The qualifier applied to the data will depend upon the severity of the exceedance. Data that are non-detected with exceeded holding times or exceptionally low spike (<10 percent) recoveries or as otherwise specified in SOP-40 (BRC, ERM and MWH 2007) will be rejected and deemed unusable. Data that are found to be outside of acceptance criteria and do not grossly exceed criteria will be qualified as estimated as specified in SOP-40 (BRC, ERM and MWH 2007). ~~.~~

Data that are found to be associated with a contaminated blank sample will be qualified as non-detect following the National Functional Guidelines and SOP-40 (BRC, ERM and MWH 2007).~~Guidelines' five- and 10-times rule which states, "Any compound detected in the sample (other than common laboratory contaminants), that was also detected in any associated blank, is qualified if the sample concentration is less than five times (5x) the blank concentration. For common laboratory contaminants, the results are qualified by elevating the quantitation limit to the concentration found in the sample when the sample concentration is less than ten times (10x) the blank concentration."~~

Data are reviewed for compliance with the pre-established project goals and limits defined by DQIs and applicable DQOs. Data that do not meet these goals or limits may require qualification to identify results that should be used with caution or should not be used for decision-making purposes.

- Case Narrative Review. Review the case narrative to ensure that any anomalies, deficiencies, or QC problems have been identified. Any corrective actions should also be discussed in the case narrative.

- Chain-of-Custody Review. Review the data package to ensure that an original copy of the chain-of-custody form has been included. Receipt signatures from laboratory personnel should be included on this form.

- Holding Time Review. Review extraction/preparation and analysis holding times for compliance with method or project-prescribed holding times.

- Matrix Spike Review. Review MS recoveries for compliance with project-specified limits, appropriate corrective actions, and potential interference from the sample matrix.

- LCS Review. Review LCS recoveries for compliance with project-specified limits, appropriate corrective actions, and to verify laboratory accuracy.

- Matrix Spike and Laboratory Duplicate Review. Review RPD calculations for compliance with project-specified limits, appropriate corrective actions, and to verify laboratory precision.

- Method Blank Review. Review method blank results for positive detections of target compounds and compare with positive sample detections for possible sample contamination.

- Trip, Field, and Equipment Rinsate Blank Review. Review trip, field, and/or rinsate blank sample results for positive detections of target compounds and compare with positive sample detections for possible sample contamination.

- Surrogate Review. Review surrogate recoveries for compliance with limits as listed in each laboratory's QA Plan to verify whether sample results were subject to interference from the sample matrix.

- Field Duplicate Sample Review. Review results for original and field duplicate samples for positive detections (the RPD is calculated for all positive detections and reviewed for agreement).

- Completeness Review. Compare the amount of valid, usable data to the amount of data collected to verify that completeness goals have been achieved.

- Comparability Review. Review data to verify that results are comparable and can be used without limitations.

- Representativeness Review. Review data set to verify that results are representative of site conditions.

D1.2 Data Validation

Validation differs from a standard review in that issues are identified through inspection of raw data. Data validation is a more thorough review process than the data review process described above. Data review will be performed for 100 percent of the data. Data validation will be performed for 100 percent of the data (reported with raw data at Level IV) that will be used in support of site characterization and subsequent evaluations; however, as a general rule of thumb, 100 percent of the data will undergo Level III data validation, and 10 to 20 percent will undergo Level IV data validation. The percentage and types of data to be validated will be defined in the site-specific investigation work plan, SAP/FSP, and/or other work plan submitted to NDEP for each data collection activity.

Data validation involves verifying calculations and procedures performed to generate sample results. When possible, laboratory data will be validated in accordance with method requirements. In the absence of method-specific requirements, data may be validated according to CLP National Functional Guidelines. Project-specific calculations or algorithms are not anticipated for the project. Documentation requirements for performing data validation will be consistent with USEPA Region 9's publication entitled *Laboratory Documentation Requirements for Data Validation* (USEPA 1997).

In addition to the data verification requirements, data validation will include the following:

- Initial Calibration Review. Review initial calibration calculations for agreement with summary form results, linearity, and method-specified minimum requirements.
- Continuing Calibration Review. Review continuing calibration calculations for agreement with summary form results, linearity, and method-specified minimum requirements.
- Internal Standard Review. Review internal standard responses to ensure that minimum and maximum method-specified requirements are met and the correct internal standard has been assigned to target compounds and surrogates.
- Target Compound Identification Review. Review target compounds identified in project and QC samples and ensure that calculated concentrations and identifications are accurate.
- Contract-Required Detection Limit Sample Review. Review contract-required detection limits against sample results for project-specified limit requirements.

- Pattern Identification Review. Review any positive sample detections of target compounds that require pattern identification with a standard, including polychlorinated biphenyls and specific TPH fractions.

D1.3 Data Qualifiers

The data review and validation procedures were designed to review each data set, and identify biases inherent to the data, and determine its usefulness. Flags may be applied to those sample results that fall outside of specified tolerance limits and, therefore, did not meet the program's QA objectives, as described in Section A7. Flags will indicate if results are considered anomalous, estimated, or rejected. Only rejected data are considered unusable for decision-making purposes; however, other qualified data may be used with limitations, or require further verification.

Flags to be used for this project are defined in SOP-40 (BRC, ERM and MWH 2007) and in the National Functional Guidelines and are listed below:

U The analyte was analyzed for but was not detected above the reported sample quantitation limit, or the analyte was detected, but qualified as non-detected during data validation due to blank contamination.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

~~N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."~~

~~NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.~~

UJ The analyte was not detected above the reported quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

~~B Analyte found in sample at less than five times the amount found in associated blank. Result is considered non-detect.~~

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified.

J+ Inorganics analyses: the result is an estimated quantity, biased high. The associated numerical value is the approximate concentration of the analyte in the sample.

J- Inorganics analyses: the result is an estimated quantity, biased low. The associated numerical value is the approximate concentration of the analyte in the sample.

Project-specific qualifiers are described in SOP-40 and include:

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

Z The associated data has not been subjected to the data review/validation process.

J+ Organics analysis: the result is an estimated quantity, biased high. The associated numerical value is the approximate concentration of the analyte in the sample.

J- Organics analysis: the result is an estimated quantity, biased low. The associated numerical value is the approximate concentration of the analyte in the sample.

J-TDS Inorganic analysis: the analytical result is estimated based on failure of total dissolved solids correctness check performed in accordance with Standard Methods.

J-CAB Inorganic analysis: the analytical result is estimated based on failure of cation-anion balance check performed in accordance with Standard Methods.

J-, TDS/CAB Inorganic analysis: the analytical result is unreliable based on failure of cation-anion balance and TDS correctness checks performed in accordance with Standard Methods.

Sample results that were generated after the required holding time but less than two times after the holding time will be qualified as estimated (J or UJ). If the samples were prepared after two times the holding time was exceeded, non-detected results will be qualified as rejected (R), while detected results will be qualified as estimated, (J), as described in the appropriate guidance

documents.~~)~~. Sample results that were generated with storage temperatures less than 2°C or greater than 6°C or as estimated (J) for the positive results and estimated or rejected (UJ or R) for non-detects based on an analyte-specific review.

SOP-40 shall be consulted for project-specific temperature exceedance qualifications. Non-detected volatile sample results should be rejected (R) if the sample temperature is considered to be at or above 15 ºC, and the sample shipment has arrived at the laboratory more than four hours after collection of the last sample, as stated in SOP-40. If this condition exists, detected sample results should be qualified as estimated with a low bias (J-).

The application of nonstandard qualifiers may be deemed necessary and used for atypical situations such as contamination of samples from a preservative. Nonstandard qualifier definitions (if applicable) are described in SOP-40 (BRC, ERM and MWH 2007) and will be included in the database. Data validation reason codes shall be assigned in the database to all qualifications and are described in SOP-40 (BRC, ERM and MWH 2007).

D1.4 Reconciliation with DQOs

During data review and validation, all data will be reconciled with the objectives set forth in this QAPP. As described in the above sections, all validation will be documented in an appropriate manner and data qualified to indicate when criteria are exceeded. Data not useful for inclusion in site evaluations will be clearly flagged as rejected. Other bias will be noted in the respective data validation memoranda to alert the data user to potential limitations.

Data will also be reconciled with the respective project DQOs, as described in Section A7, as part of the evaluation and reporting of findings of the various investigations.

D2. VERIFICATION AND VALIDATION METHODS

Field data will be verified during preparation of samples and chain-of-custody forms. Field data and chain-of-custody forms will be reviewed on a daily basis by the Field Task Manager. After field data are entered into the project database, 100 percent verification of the entries will be completed ~~by a second party~~ to ensure the accuracy and completeness of the database. Any discrepancies will be resolved before the final database is released for use.

Procedures for verification and validation of laboratory data and field QC samples will be completed as described in SOP-40 (BRC, ERM and MWH 2007) and the following USEPA guidance documents for data validation:

- *Guidance on Environmental Data Verification and Validation* (USEPA 2002b)
- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA 1999)
- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA 2004a)
- *Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA 2005)

Control limits that will be used to qualify data are described in Section D1.3, above.

Field and laboratory data for this project will undergo a formal verification and validation process. All entries into the database will be verified. All errors found during the verification of field data, laboratory data, and the database will be corrected prior to release of the final data.

Data verification and validation will be conducted in accordance with SOP-40 (BRC, ERM and MWH 2007), which is designed to be consistent with *Guidance on Environmental Data Verification and Validation* (USEPA 2002b). Data verification and validation for organic compounds and metals will be completed according to methods described in the USEPA guidance for data review (USEPA 1999, 2004a,b). Performance-based control limits established by the laboratory and control limits provided in the method protocols will be used to evaluate data quality and determine the need for data qualification. Laboratory control limits for surrogate compounds, LCSs and LCSDs, and matrix spike/MSDs will be used for data validation.

No guidelines are available for validation of data for conventional analyses and physical testing. These data will be validated using procedures described in the functional guidelines for inorganic data review (USEPA 2004a) and SOP-40 (BRC, ERM and MWH 2007), as applicable. Results for field splits and replicates will be evaluated against a control limit of 50 percent. ~~RPD. Data will not be qualified as estimated if this control limit is exceeded, but RPD results will be tabulated, and any exceedances will be discussed in the applicable site characterization summary report for each sampling event.~~ Equipment rinse blanks will be evaluated and data qualifiers will be applied in the same manner as method blanks, as described in the applicable USEPA guidance

documents for data review (USEPA 1999, 2004a,b) and SOP-40 (BRC, ERM and MWH 2007). Data will be rejected if control limits for acceptance of data are not met (USEPA 1999, 2004a,b) and SOP-40 (BRC, ERM and MWH 2007).

In addition to verification of field and laboratory data and information, data qualifier entries into the database will be verified. Any discrepancies will be resolved before the final database is released for use. The accuracy and completeness of the database will be verified at the laboratory and again as part of data validation. All entries to the database from the laboratory EDDs will be checked against the hard-copy data packages.

D3. RECONCILIATION WITH USER REQUIREMENTS

The goal of data validation is to determine the quality of each data point and to identify data points that do not meet the project criteria. Nonconforming data may be qualified as undetected, estimated, or rejected as unusable during data validation if criteria for data quality are not met. Rejected data will not be used for any purpose. An explanation of the rejected data will be included in the applicable site characterization summary report for each sampling event.

Data qualified as estimated will be used for all intended purposes and will be appropriately qualified in the final project database. These data may be less precise or less accurate than unqualified data. The data users, in cooperation with BRC project management staff and the QA Manager, will evaluate the effect of the inaccuracy or imprecision of the qualified data on site assessment and risk assessment procedures used to evaluate the Site.

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APPENDIX B

LABORATORY QUALITY ASSURANCE MANUALS
(on CD)

APPENDIX C

DATA MANAGEMENT PLAN

BRC DATA MANAGEMENT PLAN

BMI COMMON AREAS
CLARK COUNTY, NEVADA

Prepared for:

Basic Remediation Company (BRC)
875 West Warm Springs Road
Henderson, Nevada 89015

Prepared by:

ERM-West, Inc.
2525 Natomas Park Drive, Suite 350
Sacramento, California 95833

MWH
3321 Power Inn Road, Suite 300
Sacramento, California 95826

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SECTION 1

1 INTRODUCTION

This Data Management Plan (DMP) has been prepared by Basic Remediation Company (BRC) to address the handling of data generated from site investigation activities at the Basic Management, Inc. (BMI) Common Areas in Clark County, Nevada. All sampling and analysis activities at the Site are conducted under the oversight of the State of Nevada Department of Conservation and Natural Resource, Division of Environmental Protection (NDEP) pursuant to the Phase II Consent Agreement for the BMI Common Areas (Consent Agreement) executed between the Henderson Industrial Site Steering Committee and NDEP on February 23, 1996.

Data management is fundamental to the data collection activities to be conducted at the BMI Common Areas. The purpose of this DMP is to identify the procedures to be followed for an orderly, accurate, and efficient program for managing data acquired for assessments and report generation. This DMP discusses the approach that will be undertaken regarding data acquisition, data maintenance, data verification data analysis and data reporting during planned activities.

1.1 SYSTEM OVERVIEW

Data management is an integrated system of database and analytical tools residing on personal computers and workstations tied together into the local area network (LAN). The primary tool for storing data generated for this project is the Environmental Quality Information System (EQuIS) Data Management System. EQuIS is a commercial environmental database provided by EarthSoft, Inc. This software is used to generate the project database. Other EQuIS tools that are integrated for use with the project database include the EQuIS Data Qualification Module and EQuIS Geology.

The LAN allows for chemistry, graphics and modeling workstations to access the centrally stored data through the server configuration. This setup provides shared access of the data while limiting duplication of data and data entry efforts. The data format contained in the project database has been designed to support other graphic tools such as Geographic Information System (GIS) (*e.g.*, ArcGIS™) which is provided commercially by Environmental Systems Research Institute (ESRI).

1.2 ROLES AND RESPONSIBILITIES

The roles and responsibilities of the project team are as follows:

The Project Manager is ultimately responsible for assuring that data are properly acquired, accurately reported, properly stored, and used when needed. The Project Manager is also responsible for all aspects related to the data collection task, including coordination of field activities, data acquisition and tracking, and reporting.

The Data Manager is responsible for managing all data entered into the database. This includes verifying the accuracy of data provided by analytical laboratories, confirming that the electronic deliverables provided by the laboratory and other subcontractors are legible and accurate, tracking samples sent to the laboratory, verifying that analyses are conducted as requested, and providing hard copy and electronic data tables for use in data analysis and report generation.

The Project Chemist's primary responsibility is to review and to validate data deliverable. After these data evaluations, the Project Chemist will assign appropriate qualifiers and prepare data quality reports. The Project Chemist will be the laboratory contact person for questions and / or revisions of procedures, methods, or Chain-of-Custody (COC) forms. The Project Chemist will also be responsible for verifying laboratory procedures and conducting laboratory audits.

Technical staff are responsible for collecting and accurately recording data in the manner set forth in the project Standard Operating Procedures (SOPs) contained in project Field Sampling and Standard Operating Procedures (FSSOP) manual (BRC, ERM and MWH 2007). This responsibility includes verifying that; 1) all available data pertaining to the conducted tasks are collected; 2) forms are completed fully and in a legible manner; and 3) the data are compiled in a manner facilitating proper filing, storage, or direct use.

SECTION 2

2 DATA ACQUISITION

Data management tasks begin during field activities with data acquisition. Data collected during planned investigations will include analytical results provided by a laboratory, field observations (*e.g.*, soil boring logs) and measurements generated using field instruments.

Analytical results generated by the laboratory will be provided in hardcopy form and in electronic data deliverable (EDD). The EDDs will be provided by the laboratory in a format that is directly compatible with the EQuIS Chemistry database (Table C-1).

Table C-1. Enhanced EQuIS Chemical Electronic Data Deliverable Format

sys_sample_code	Text [40]	Field Sample Identification
sample_matrix_code	Text [10]	Sample Matrix
sample_date	Date	Sample Collection Date
sample_time	Text [5]	Sample Collection Time
sample_receipt_date	Date	Date Sample Received by Lab
sample_receipt_time	Text [5]	Time Sample Received by Lab
sample_delivery_group	Text [10]	Laboratory Report Reference Number
lab_anl_method_name	Text [35]	Analytical Method Number
analysis_date	Date	Analysis Date
analysis_time	Text [5]	Analysis Time
total_or_dissolved	Text [1]	Total or Dissolved Basis
test_type	Text [20]	Analtyical Run Type (primary, dilution, re-extract)
test_batch_id	Text [20]	Laboratory Preparation Batch Code
test_batch_type	Text [10]	Extraction Method Type (analysis, leachate)
basis	Text [10]	Wet or Dry Basis (soil)
container_id	Text [30]	Container Specific Identification
dilution_factor	Single	Dilution Factor for Result
lab_prep_method_name	Text [35]	Extraction Method Number
prep_date	Date	Sample Extraction Date
prep_time	Text [5]	Sample Extraction Time
leachate_method	Text [15]	Leachate Method Number
leachate_date	Date	Sample Leachate Date
leachate_time	Text [5]	Sample Leachate Time
lab_sample_id	Text [20]	Lab Sample Identifier
percent_moisture	Text [5]	Sample Percent Moisture (soil)
analyst_name	Text [30]	Initials of Analyst
instrument_id	Text [50]	Instrument Idenfication
comment	Text [255]	Laboratory Comments
cas_rn	Text [15]	Chemical Abstract Service No.
chemical_name	Text [60]	Compound Name

Table C-1. Enhanced EQuIS Chemical Electronic Data Deliverable Format

result_value	Text [20]	Measured Concentration
result_error_delta	Text [20]	Uncertainty Value
detect_flag	Text [2]	Defined Detection [Yes(Y) or No (N)]
lab_qualifiers	Text [7]	Laboratory Flags
method_detection_limit	Text [20]	Method Detection Limit
reporting_detection_limit	Text [20]	Sample Reporting Limit
result_unit	Text [15]	Units of Measure - Result
detection_limit_unit	Text [15]	Units of Measure - DL
qc_original_conc	Text [14]	Concentration in Parent Sample
qc_spike_added	Text [14]	Concentration Spiked
qc_spike_measured	Text [14]	Concentration in Spiked Sample
qc_spike_recovery	Text [14]	Calculated Accuracy Percentage
qc_dup_original_conc	Text [14]	Concentration in Parent Sample
qc_dup_spike_added	Text [14]	Concentration Spiked
qc_dup_spike_measured	Text [14]	Concentration in Spiked Sample
qc_dup_spike_recovery	Text [14]	Calculated Accuracy Percentage
qc_rpd	Text [8]	Relative Percent Difference Between Duplicates
qc_spike_lcl	Text [8]	Minimum Accuracy Control Limit
qc_spike_ucl	Text [8]	Maximum Accuracy Control Limit
qc_rpd_cl	Text [8]	Maximum RPD Control Limit

EQuIS Geology is used to store data regarding soil borings, lithology, well construction and completion, and groundwater levels. Field information is compiled in field notebooks and/or data collection forms which will be subsequently used for input the data in the EQuIS Geology EDD template. Field information supported by the EQuIS Geology EDD includes:

- Site data
- Location data (survey coordinates, including elevation)
- Field sampling data (including matrix, sampling depth, sampling data and time, physical description, water levels, etc.)
- Well construction details
- Laboratory data for geologic physical parameters

Once the project staff has verified the project databases the data are available for downloading and assembly for evaluation and reporting purposes.

SECTION 3

3 DATA DOCUMENTATION AND TRACKING

Thorough documentation of sampling activities is critical to the success of the data acquisition process. Specifically, observation regarding site condition or sample collection techniques may have a significant impact on data evaluation and interpretation. Field observations can often be used to explain anomalous chemical detections and to support delineation of the extent of areas of concern. The ultimate goal of documentation is to establish records that meet acceptable standards of accuracy, precision, and completeness, comparability, and representativeness. These standards can be attained by providing the complete documentation listed in this section and by following the standard documentation procedures included in the BRC Quality Assurance Project Plan (QAPP; BRC, ERM and MWH 2008).

Likewise, the tracking process is critical to the success of planned sampling activities because if analyses are not performed as requested or within appropriate holding times, the usefulness of the data may be jeopardized. The procedures described in this section were developed to minimize the potential for laboratory misinterpretations of the requested analyses by providing an early warning system.

Data collected during any planned sampling activity will include analytical results provided by a laboratory, as well as field observation and measurements generated using field instruments. Procedures associated with documenting and tracking both types of data are summarized below.

3.1 LABORATORY DATA

Samples will be collected according to a specific workplan approved by NDEP. In all cases, a record of collected samples will be made on a sample collection form (*e.g.*, bound field work book, drilling log form, or another project-specific form). Samples submitted for analysis will be recorded on an accompanying COC form as soon as possible after collection in accordance with the QA/QC procedures outlined in the QAPP (BRC, ERM and MWH 2008). Copies of all COC forms will be provided to the Data Manager as soon as possible after sample collection.

Following transfer of the samples to the laboratory, the Data Manager, or designee will track the samples according to the following steps:

- COC forms will be compared to the sample collection plan contained in the respective workplan or FSP;

- Upon receipt from the laboratory, the cover page of the laboratory data report will be stamped as received, and copies will be distributed to the appropriate project staff;
- Verify that the laboratory data report is complete and consistent with the sample schedule.
- Make a copy of the laboratory report for data entry purposes and provide the original laboratory report for storage in the project files.

If the COC is found to be in error, the laboratory will be notified of the error and provided with the correct information. The laboratory will make a correction to the original COC and file a laboratory corrective action form so that the analyses are performed as requested. If the sampling schedule is found to be in error, or if sampling was not performed according to the schedule either due to an unforeseen problem in the field or sampler error, the Data Manager will document the change on the database copy of the schedule. If the laboratory report is found to be incomplete or in error, the laboratory will be notified so that corrective action may be taken by the laboratory.

3.2 RECORDKEEPING

Field data will be recorded in field notebooks and / or data collection forms. These records should be neat, legible, completed in dark, permanent ink, and signed and dated by the person completing the page (or entry). Corrections will be made by striking out the incorrect entry, entering the corrected value or text, and dating and initialing the document; the original entry will remain visible.

A complete record of all samples, whether submitted for laboratory analysis or not, will be maintained during all sample collection activities. Boring logs will typically be used during subsurface sampling events (*i.e.*, drilling, cone penetrometer, geoprobe®) to document subsurface condition, sampling techniques, and any pertinent observations noted during the sampling event. Boring logs provide both a summary of information recorded during the sampling event as well as a graphical representation of the subsurface. The information provided on boring logs is utilized for the preparation of geological cross sections and for hydrogeologic characterization. Specific requirements for information to be included on boring logs are provided in the soil sampling SOP (see BRC, ERM and MWH 2007).

Copies of the forms or notebook will be provided to the Task Manager, and the data that will be recorded in the database will be provided to the Data Manager. The data are then entered into the

database using the EQuIS system (*e.g.*, EQuIS Chemistry or EQuIS Geology) by or under the supervision of the Data Manager. Survey data will be supplied in both hard copy and electronic data deliverable (EDD) format, when possible, for entry into the project database.

SECTION 4

4 DATA REVIEW AND VERIFICATION

Data review, including a QA/QC review, will be performed on all field and laboratory analysis data generated. Data review of laboratory reports will begin with the receipt of analytical reports and end with completion of the review / validation process prior to entry into the database. Review of field data will begin shortly after the data are acquired and before they are entered into the database or filed. Data review will adhere to procedures outlined in SOP-40 and the project QAPP.

4.1 PRELIMINARY REVIEW AND VERIFICATION OF ANALYTICAL RESULTS

All data entered into the database will undergo a preliminary review and verification to ensure the accuracy of the database. The preliminary review and verification procedures will vary depending on the nature and source of the data. These procedures are described below for electronic analytical data files, manually entered analytical data files, and field data.

4.1.1 Electronic Analytical Data Files

Laboratory electronic analytical data will be primarily transmitted via e-mail from the laboratory or mailed on CD-ROM. Because there are occasional discrepancies between hardcopy report and electronic copies, a preliminary review and verification will be performed on all data generated. The preliminary review and verification of the data will be performed prior to entry of the data into the database under the direction of the Data Manager. These preliminary review and verification procedures are as follows:

- After a complete EDD is provided, the EDD will be printed out for review by the Data Manager or a qualified designee;
- The file name, data of verification, and the verifier's initials will be entered on each EDD printout;
- The printed version of the EDD will then be verified against the hard copy of the laboratory report;

If minor errors in the EDD are found, corrections will be made on the printout by the verifier.

The corrections will be applied to the database version of the EDD, and the laboratory will be notified of the revisions. If significant errors in the EDD are found, the Database Manager will contact the laboratory to provide a revised version of the EDD with the corrections.

To facilitate quality reviews of the laboratory data, the EquIS Data Qualification Module will be employed to make rapid assessments regarding the quality of the environmental data.

4.1.2 Manually-Entered Analytical Data Files

For analytical data not provided in an EDD, the data will be manually entered into an electronic file, which can be imported into the EQuIS database. This file will then be the equivalent of the laboratory EDD. The EDD will then be verified as outlined in the steps above. If needed, corrections will be made on the printout and then entered into the database file. Documentation on the printout also includes the data and initials of the verifier.

4.1.3 Final EQuIS Data Verification

The final data stored in the EQuIS database are continuously checked for completeness and integrity. To ensure accuracy and consistency, the following quality checks are carried out on each subset of data loaded into the database:

- Automatic scripts are run to verify that referential integrity exists throughout the permanent tables that make up the database.
- Samples of the environmental data, as well as the QC data, are manually verified against hard copy for accuracy and consistency.
- An electronic check is conducted to verify that the test methods are consistent and expected.
- An electronic check is conducted to verify that the samples listed on the COCs match those provided in the EDDs.
- Automated scripts are run to verify that the proper field and laboratory QC samples were taken and analyzed.

Any discrepancies discovered in the verification process are corrected before the data are considered as valid.

4.2 DATA MAINTENANCE

Data maintenance functions encompass all tasks associated with loading, verifying, storing, and reporting the data. Data are loaded and stored in the EQuIS Data Management System. To protect against delays or loss of data due to computer malfunction, the database will be backed-up routinely during periods when new data have been entered. A complete back-up copy of the database will be maintained in a locked file in the project team office near the central database.

4.3 ARCHIVING

Data acquired during field sampling activities will be archived in an appropriate manner to ensure integrity and retrieval of the data. Specifically, all primary data including completed forms, project notes, correspondence, analytical data reports, photographs, surveying information, computations, and electronic media will be stored in the primary project files. The database will contain all archived electronic analytical data as described above.

For specific soil collection activities, additional soil cores and soil chip trays obtained during drilling tasks will be archived in an appropriate storage facility for future reference. In addition to retaining physical media, photographic documentation of the soil cores and soil chip trays will be kept in the primary project files.

All archived files and other media are considered privileged and confidential and will be stored in secure locations at the project office. Access to the data files is restricted to project personnel, BRC and NDEP representatives.

5 REFERENCES

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