TITLE AND APPROVAL PAGE (QAPP WORKSHEET #1)

1260307

SPLIT-SAMPLING AND OVERSIGHT QUALITY ASSURANCE PROJECT PLAN DEMONSTRATION OF METHOD APPLICABILITY REMEDIAL INVESTIGATION

US MAGNESIUM NPL SITE
EPA SITE IDENTIFICATION NO. UTN000802704
TOOELE COUNTY, UTAH

September 2012

Prepared for:

U.S. EPA Region 8
Denver, Colorado

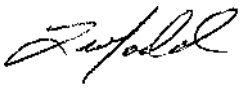
Prepared by:

PWT RAC TEAM

Approved by:

September 28, 2012

U.S. EPA — Date
Ken Wangerud, RPM, EPR-SR



September 28, 2012

Pacific Western Technologies, Ltd. — Date
Levi Todd, P.E., Project Manager

September 28, 2012

Pacific Western Technologies, Ltd. — Date
Dorthea L. Hoyt, P.E., Quality Assurance Manager

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ATTACHMENTS

SECTION A: PROJECT ORGANIZATION

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SAP IDENTIFYING INFORMATION (QAPP WORKSHEET #2)

Site Name/Number: US Magnesium NPL Site, Tooele County, Utah
EPA Site Identification No. UTN000802704

This Demonstration of Method Applicability (DMA) Oversight Quality Assurance Project Plan (QAPP) was prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300.415(b)(4)(ii), the requirements of the "Uniform Federal Policy for Quality Assurance Project Plans" (UFP-QAPP) (EPA 2005), the "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS" (EPA 2001). This QAPP is project-specific and pertains only to Phase 1A DMA oversight activities. EPA Region 8 (Region 8) is the lead agency for the project with support from the Utah Department of Environmental Quality (UDEQ). Pursuant to the August 2011 Administrative Order on Consent (AOC) and Statement of Work (SOW) with US Magnesium (US Mag), Environmental Resources Management (ERM) is performing work under the Final DMA Work Plan (EPA 2012). The activities of this Oversight QAPP are being conducted pursuant to Article VII, Section 31 of the AOC.

EPA anticipates that the Remedial Investigation (RI), Risk Assessment (RA), and Feasibility Study (FS) for the Site will be implemented in phases, as further noted in the Final DMA Work Plan (EPA 2012). In accordance with the AOC (EPA 2011), EPA and ERM-US Magnesium held scoping sessions regarding the RI, and in particular, Phase 1 of the RI. These scoping sessions and supporting discussions led ERM/USMag to propose carrying out Phase-1 investigations in two sub-parts:

- Phase-1A: focus on (1) identifying COPCs and (2) conduct human exposure and ecological habitat surveys, to be followed by,
- Phase-1B: investigating the preliminary nature and extent of contamination.

EPA agreed with ERM that this approach had merit, and planning proceeded accordingly. In addition, ERM and EPA/UDEQ recognized that 'proof-of-concept' sampling/analysis work was needed (as described in EPA Technology Bulletin EPA 542-F-10-010, "Best Management Practices: Use of Systematic Project Planning Under a Triad Approach for Site Assessment and Cleanup") prior to proceeding with the full scope of Phase 1A.

EPA has issued a Final DMA Work Plan (EPA 2012) that presents the objectives, approach, evaluation criteria, and scope of work to be conducted by ERM for the Phase 1A DMA for soil, sediment, solid waste, liquid waste, and water matrices.

This DMA Oversight QAPP is intended to guide EPA's split-sampling and oversight of ERM's sampling and analysis activities during the DMA. This QAPP will frequently reference the Final DMA Work Plan (EPA 2012) in order to avoid duplication and inconsistency.

DISTRIBUTION LIST (QAPP WORKSHEET #3)

The EPA will distribute the DMA Oversight QAPPs to the parties identified below.

Name of QAPP Recipients	Title/Role	Organization	Telephone Number	E-mail Address
Ken Wangerud	RPM/WAM	EPA	Office: (303) 312-6703 Mobile: (720) 951-0955	Wangerud.ken@epa.gov
Chad Gilgen	Project Manager	UDEQ	(801) 536-4237	Cgilgen@utah.gov
Levi Todd	Project Manager	PWT	Office: (303) 274-5400, ext 48 Mobile: (303) 501-4907	ltodd@pwt.com
Dorthea Hoyt	Quality Assurance Manager	PWT	Office: (303) 274-5400, ext. 54 Mobile: (303) 482-6973	dhoyt@pwt.com
Aaron Baird	PWT Field Team Lead/HSC	PWT	Office/Mobile: (720) 202-2664	abaird@pwt.com
Robert Howe	Geochemist	TTEMI	Office: (303) 441-7911 Mobile: (303) 518-1083	Robert.howe@tetratech.com
David Abranovic	Partner/Project Manager Project Coordinator, US Mag RI/FS	ERM	Office: (480) 998-2401 Mobile: (602) 284-4917	David.Abranovic@erm.com
Kevin Lundmark	Field Team Leader	ERM	Office: (801) 595-8400 Mobile: (801) 440-8296	kevin.lundmark@erm.com

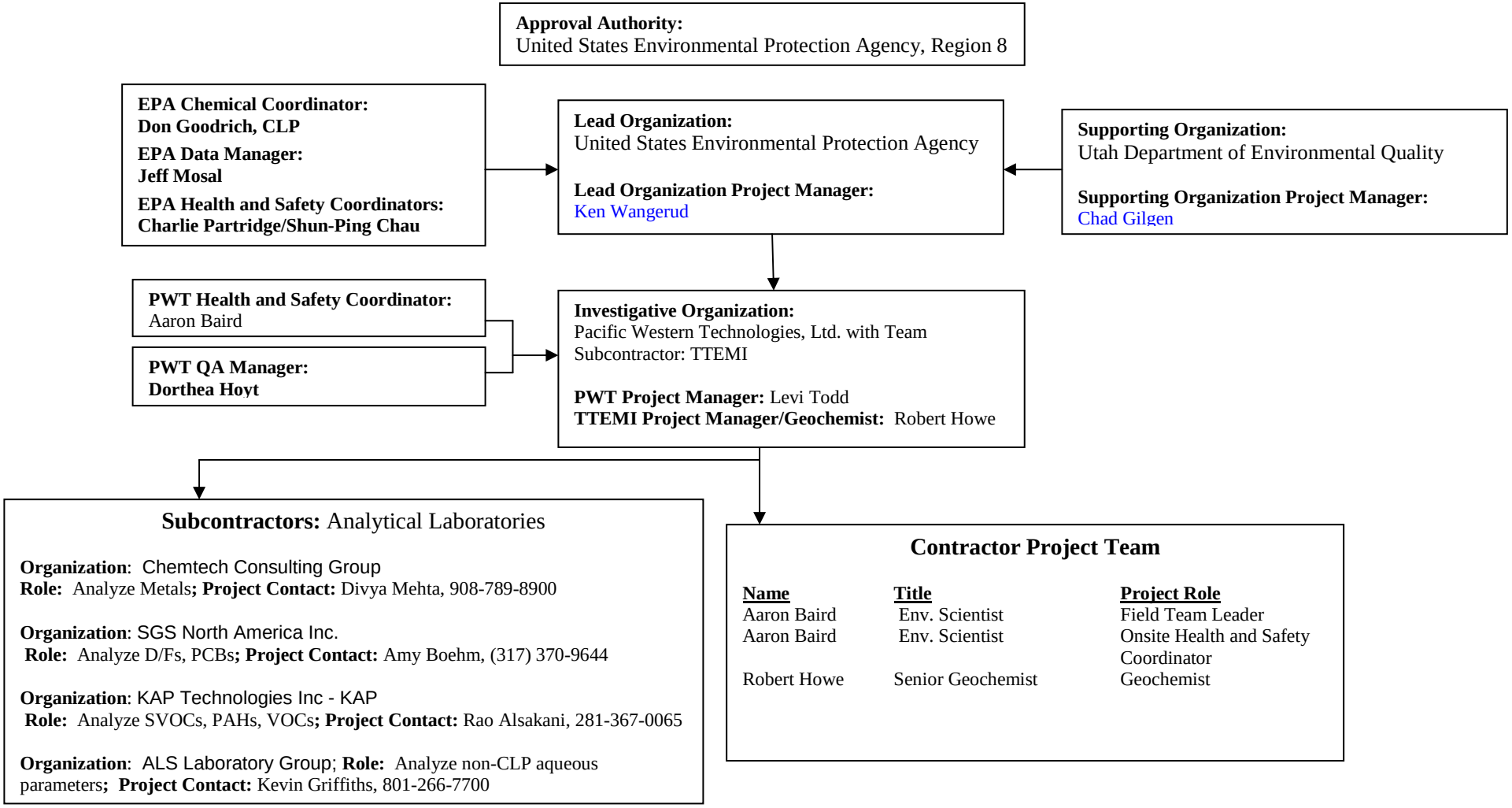
PERSONNEL SIGN-OFF SHEET (QAPP WORKSHEET #4)

The Project Personnel Sign-Off Sheet documents that project personnel performing work have read this QAPP and will carry out the tasks as described. The Project Manager, Site Safety Coordinator (SSC), and other oversight personnel are responsible for communicating the requirements of the applicable portions of the QAPP to field personnel. To ensure that Site field personnel have read and understood the QAPP, the supervisory personnel will meet with each and review the QAPP before any work is conducted on the Site. The sign-off sheet, which will be included in the central project file, will be signed by all on-Site personnel after they have read the QAPP. However, if only a portion of the QAPP was reviewed, then personnel will note which sections were reviewed on the sign-off sheet.

Name	Organization/Title/Role	Signature/E-Mail Receipt	QAPP Section Reviewed	Date QAPP Read
Levi Todd	PWT Project Manager			
Dorthea Hoyt	PWT Quality Assurance (QA) Manager (QAM)			
Aaron Baird	PWT Health and Safety Coordinator			
Aaron Baird	PWT Field Team Leader			
Robert Howe	TTEMI Geochemist			
Amanda Semenenko	Data Manager			

PROJECT ORGANIZATIONAL CHART (QAPP WORKSHEET #5)

The Project Organizational Chart identifies reporting relationships for the lead organizations and all contractor and subcontractor organizations, including the organizations providing field sampling, Site related analysis, and data review services.



COMMUNICATION PATHWAYS (QAPP WORKSHEET #6)

The Communication Pathways worksheet identifies lines of communication that will be used during the project.

Communication Drivers	Responsible Affiliation	Name	Phone Number or E-Mail	Procedure
Project management	PWT Project Manager	Levi Todd	Office: (303) 274-5400, ext 48; Mobile: (303) 501-4907; ltodd@pwt.com	Project manager will manage field and project personnel, and serve as liaison to the EPA, team members, and all subcontractors.
Quality control (QC) management	QA Manager	Dorthea Hoyt	Office: (303) 274-5400, ext 54; Mobile: (303) 482-6973; dhoyt@pwt.com	QAM will remain independent of direct project involvement and day-to-day operations. The QAM will ensure implementation of the quality assurance elements outlined in this QAPP. Tasks include review of plans and procedures and performing/overseeing on-Site field QC audits, as appropriate. The QAM will be the point of contact with the PWT Project Manager for quality matters.
Coordination and communication of fieldwork activities related to sampling	PWT Field Team Leader with support by TTEMI Geochemist	Aaron Baird Office/Mobile: (720) 202-2664; abaird@pwt.com Robert Howe: Office: (303) 441-7911 Mobile: (303) 518-1083; robert.howe@tetratech.com		Field team lead will communicate relevant field information to the project manager and analytical coordinator. Field team lead will also report all drilling or sampling equipment problems to the project manager immediately via phone or e-mail.
Field data and quality control reports				Field team leader will generate and report data and documents as required by the Oversight Data Management Plan along with quality control reports to the EPA RPM and Site project manager.
Coordination of laboratory supplies for field activities				The Field Team Leader will contact the laboratory to provide all necessary sample containers and appropriate shipping materials (such as coolers and bubble wrap) to be delivered on Site before field sampling begins and throughout the project.
Submittal of samples to the laboratory				Sampling personnel will package and ship samples in accordance with this QAPP.
Daily chain-of-custody records and shipping documentation				Chain-of-custody records and shipping documentation will be submitted via fax or e-mail to the analytical coordinator at the end of each day that samples are collected.

Communication Drivers	Responsible Affiliation	Name	Phone Number or E-Mail	Procedure
Sample shipping/receipt issues	Laboratory Project Manager	See WS #30	See WS #30	The laboratory project managers will report all sample shipping and receipt issues associated with the investigation to analytical coordinator within 2 business days.
Reporting laboratory data and quality issues	Laboratory Project Manager	See WS #30	See WS #30	Report documents and data in an electronic format as required by the Oversight Data Management Plan and report QA and QC issues .
Field and analytical corrective actions	TTEMI Geochemist	Robert Howe	Office: (303) 441-7911 Mobile: (303) 518-1083; robert.howe@tetratech.com	The Field Team Leader and/or geochemist will immediately notify the QAM in writing of any field or analytical procedures that were not performed in accordance with this QAPP. The analytical coordinator, in coordination with the QAM, will complete documentation of the non-conformance and corrective actions to be taken. The Field Team Leader will verify that the corrective actions have been implemented.
Minor deviations from QAPP procedures identified during field activities	Field Team Lead	Aaron Baird	Office/Mobile: (720) 202-2664; abaird@pwt.com	The field team leader will prepare a field change request for any minor changes in sampling procedures that occur as a result of conditions in the field. This request will be submitted to the QAM for approval before the change is initiated.
QAPP amendments	PWT Project Manager, EPA RPM	Levi Todd, PWT; Ken Wangerud, EPA	Office: (303) 274-5400, ext 48; Mobile: (303) 501-4907; ltodd@pwt.com; Office: (303) 312-6703 Mobile: (720) 951-0955 Wangerud.ken@epa.gov	Any changes to the QAPP will require the QAM to prepare an addendum that will be approved by the PWT PM and EPA RPM before any field activities begin.
QAPP – routine communications regarding analyses during implementation	TTEMI Geochemist	Robert Howe	Office: (303) 441-7911 Mobile: (303) 518-1083; Robert.howe@tetratech.com	Primary point of contact to ensure that analytical services comply with the QAPP so that resulting data will meet data quality objectives.
QAPP – routine communications during implementation	NA	NA	NA	Responsible for ensuring subcontractor activities are conducted in accordance with requirements of the QAPP; coordinates subcontractor activities with project manager or field team lead.

PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS TABLE (QAPP WORKSHEET #7)

The Personnel Responsibilities and Qualifications Table provides a list of personnel (and accompanying qualifications) with appropriate experience to perform the necessary activities outlined in this QAPP.

Name	Title/Role	Organizational Affiliation	Responsibilities
Levi Todd	PWT Project Manager	PWT	Responsible for providing management and technical oversight during data collection efforts. Actively participates in project DQO process. Provides oversight of the QA program, including review and sign-off on QAPPs and any future modifications to the plans; provides quality-related direction through the EPA RPM to the Site QAM; and has authority to suspend affected project or Site activities if approved quality requirements are not adequately met.
Dorthea Hoyt	PWT Program QA Manager	PWT	Overall QA and QC of technical work at the Site; develops and maintains a comprehensive QA program and is responsible for audits, reviews of work performed, and recommendations to project personnel regarding quality. Provides QA and QC of technical work carried out at the Site; works closely with and reviews work carried out by the project team; and reviews deliverables to verify conformance with QA and QC procedures.
Aaron Baird	Health and Safety Coordinator	PWT	Responsible for implementing the health and safety plan and accident prevention plan; authority to correct and change Site control measures and the required level of health and safety protection; and primary on-Site enforcement authority for the policies and provisions of the health and safety program and health and safety plan. Conducts safety briefings for Site and subcontractor personnel and Site visitors, and can suspend operations that threaten health and safety of workers and visitors.
Aaron Baird	Field Team Lead	PWT	Directs the day-to-day field activities and oversees all subcontractors; verifies that field measurement and sampling procedures are conducted in accordance with the QAPP. Coordinates analytical tests with the information required from the field activity; sets up contracts with laboratories to conduct required analyses; coordinates pickup and delivery schedules with laboratories.
Robert Howe	Geochemist	TTEMI	Supports the Field Team Leader in field oversight activities, supports review of, and data verification/validation of split sampling Verifies that the laboratories implement the requirements of the QAPP.
Amanda Semenenko	Database Manager	PWT	Responsible for developing, monitoring, and maintaining project database under guidance of project manager, and works with analytical coordinator during preparation of the QAPP to resolve sample identification issues.

SPECIAL PERSONNEL TRAINING REQUIREMENTS (QAPP WORKSHEET #8)

The Special Personnel Training Requirements identifies the training that personnel who implement Site related work must meet. Health and safety-related training is identified in PWT's Site-Specific HASP (PWT 2012). At a minimum, this training includes the Occupational Safety and Health Administration training requirements defined in Title 29 Code of Federal Regulations Part 1910.120(e). These requirements include (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-Site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training. Field personnel who directly supervise employees engaged in hazardous waste operations also shall have at least 8 additional hours of specialized supervisor training. Members of every field team will maintain current certification in the American Red Cross "First Aid" and "Cardiopulmonary Resuscitation Modular," or equivalent.

In addition, field team members must attend the US Magnesium Contractor training prior to the start of field work. Attendance will be recorded by the Field Team Lead in the field logbook.

JOINT PROJECT PLANNING SESSION(S) PARTICIPANT SHEET (QAPP WORKSHEET #9)

Development of this QAPP occurred through consultations between EPA RPM and PWT; additional coordination discussions were held between PWT and ERM.

SECTION B: CONCEPTUAL SITE MODEL

QAPP WORKSHEET #10

CONCEPTUAL SITE MODEL (QAPP WORKSHEET #10)

In accordance with scoping meetings held between EPA and ERM/US Mag in November 2011 and April 2012, the Conceptual Site Model (CSM) (to be included in the Draft Phase 1A Sampling and Analysis Plan) is in development by EPA.

SECTION C: DATA QUALITY OBJECTIVES

QAPP WORKSHEET #11

PROJECT QUALITY OBJECTIVES AND SAMPLING STRATEGY (QAPP WORKSHEET #11)

Scoping meeting discussions about the CSM, in development for the Draft Phase 1A SAP, established that the Rowley plant has produced magnesium metal and associated byproducts from 1972 to the present, and has been the source of releases of various solid, liquid and gaseous wastes and chemical contaminants to the surrounding environment. Historical investigations and previous risk assessments have shown the potential for human health and ecological risks at the Site.

11.1 PROBLEM STATEMENT

Available data are insufficient to fully characterize contaminant type and distribution across the Site and to support a thorough identification of Chemicals of Potential Concern (COPCs) for completing assessments of risk to human and ecological receptors. A human health risk assessment and an ecological risk assessment will be conducted for the Site. In accordance with CERLCA, the NCP and EPA guidance, EPA will use the risk assessments along with other information to determine whether risks are unacceptable and whether remedial alternatives need to be evaluated in a feasibility study.

EPA has recognized that based on the nature of the information needs, the RI would have to be implemented in phases. Initial scoping discussions between ERM and EPA had laid out a Phase-1 objective consisting of (a) identification of COPCs and (b) a preliminary understanding of the nature and extent of such contaminants. However, further scoping discussions (engaging a variety of approaches to addressing statistical and sampling uncertainties) resulted in ERM proposing that an initial phase of investigations be undertaken focusing solely on the activities needed to carry out a Demonstration of Methods Applicability (DMA) and accomplish selection of COPCs.

The specific objectives for the Phase 1A DMA (EPA 2012) being implemented by ERM are to:

1. Evaluate the implementability of sampling methods for soil, sediment, solid waste, wastewater, and some of the surface water conditions expected to be encountered during Phase 1A investigations;
2. Demonstrate the performance of proposed laboratory analytical methods for analyzing soil, sediment, solid waste, wastewater, and surface water samples;
3. Evaluate the reproducibility of sampling and analytical results using proposed SOPs for soil, sediment, and solid waste; and
4. Evaluate data management protocols.

During the DMA, EPA intends to collect splits of soil and water samples collected by ERM to document and confirm ERM sampling results and performance. This split-sampling QAPP addresses only the DMA part of the planned RI program.

11.2 PRINCIPAL DATA QUALITY OBJECTIVES FOR THE SPLIT-SAMPLING PROGRAM

Data Quality Objectives (DQOs) define the type, quality, quantity, purpose, and intended uses of data to be collected (EPA 2006a). The design of a study is closely tied to its DQOs, which serve as the basis for important decisions regarding key design features such as the number and location of samples to be collected and the analyses to be performed. The DQO process typically follows a seven-step procedure that is intended to help ensure that the project plan is carefully thought out and that the data collected will provide sufficient information to support the key decisions which must be made. The following sections present the information used in the seven-step DQO process associated with Phase 1A DMA studies.

11.2.1 DQOs FOR SOIL/SEDIMENT/SOLID-WASTE AND WATER SPLIT SAMPLES

Step 1: State the Problem

Soil/Sediment/Solid Wastes

COPCs are environmental contaminants that occur at a concentration in an environmental medium at a site that may approach or exceed a level of concern for human or ecological receptors. In general, the first step in the risk assessment process is to review available data on the occurrence of a wide range of chemicals in environmental media and to select a subset (the COPCs) that require quantitative evaluation in the risk assessment.

Historic data collected at the Site in earlier investigations provide some insight into the chemicals that are likely to be of chief concern in soil/sediment and solid wastes at the U.S Magnesium Site, these data are sufficiently dated that they may not accurately represent current Site conditions. In addition, not all solid media have been well characterized previously, and the historic data are often restricted to a subset of analytes. Hence, the historic data do not provide a firm basis for COPC selection for soil/sediment/solid wastes. Consequently, new data are needed to support the selection of human and ecological COPCs for these media.

Surface Water and Wastewater

Very little historical surface water and wastewater data have been collected at the Site. Only five samples have been collected and data for three of these surface water samples are available for use. The available surface water sample data were collected exclusively from the Southeast and Northwest ponded waste lagoons. Multiple potential sources of process waste water feed into the waste conveyance ditch system (PRI 1). No surface water sampling has been conducted in PRI 1. Numerous evaporation ponds, surface water bodies, and ditches surround the waste disposal areas. No sampling has been performed in these peripheral water bodies to evaluate the impacts from the Site and the expected high salinity of some of the water bodies on analytical method performance.

Step 2: Identify the Goal of the Study

The goal of the split-sampling program is to evaluate whether analytical results generated by ERM are reproducible as compared to EPA split sample analytical results.

Step 3: Identify Information Inputs

The analytical results from the ERM's DMA sampling and EPA's DMA split-sampling program will be used to evaluate the reproducibility and data quality.

In order to produce results that can be used to evaluate reproducibility, the DMA sampling strategy to be performed by ERM must be capable of collecting samples of solid and liquid media from a specified sampling horizon at specified sampling locations, include methods capable of collecting sufficient volume such that investigative, quality control, and split samples can be collected and processed in the field, and provide sample splits to EPA that are representative of ERM samples, In addition, the split-sampling analytical strategy must utilize comparable analytical methods to the extent practicable as the ERM proposed analytical methods.

The inputs needed to evaluate whether the analytical results are reproducible are:

- A defensible set of ERM and EPA analytical data generated using approved sample processing and analytical methods with comparable quantitation limits. Laboratory analytical data will meet applicable criteria for definitive data as defined under EPA guidance (EPA 2006b), the requirements of the CLP SOWs, and the measurement performance criteria for sampling and analysis that are defined in this QAPP (Worksheets #12 and #15).

Step 4: Define the Boundaries of the Study

This split-sampling program is limited to the DMA. The boundaries of the DMA sampling program are identified in the Final DMA Work Plan (EPA 2012). This QAPP will be amended as necessary for subsequent phases of the RI.

Step 5: Develop a Decision Rule

The decision rule is defined as:

- Null Hypothesis: The ERM sample analytical results are reproducible.
- Decision Rule: ERM analytical results will be considered reproducible if the comparison to the split-sampling analytical results meet the criteria identified below.

Step 6: Specify Performance or Acceptance Criteria

The reproducibility of ERM samples will be evaluated by calculating the mean relative percent difference (RPD) between the ERM and corresponding EPA split samples, and applying the criteria below. Generally, RPDs less than 35% will indicate the data are reproducible, as defined in the following table.

ERM and EPA Results	Project-Specific Measurement Performance Criteria
Both Results > 5x the QL	Metals: RPD ≤ 35 All other analyses: RPD ≤ 50
Both Results < 5x the QL	Results within ± 2x the QL
Both Results < the QL	RPD not calculable
One Result < the QL	RPD not calculable

Consideration of other statistical techniques or sampling activities moving forward may be required if the data collected do not meet the above decision criteria. The need for corrective action and the nature of the required corrective action will be evaluated once the data are available such that the nature and scope of the sampling and analytical issues can be further evaluated.

The potential for decision errors exists because analytical measurements inherently contain sampling and analytical sources of measurement errors. Decision errors can occur when a data collection scheme does not adequately address the sources of variability in contaminant estimation at a site. Contaminant concentration estimation errors can occur as a result of spatial heterogeneity or variability on many scales from large to small and on a micro-scale. The DMA is designed to reduce the impacts of micro-scale heterogeneity through the use of homogenization during sample processing both in the field and in the laboratory.

Step 7: Develop the Plan for Obtaining the Data

The plan to collect split samples from 100 percent of the total ERM samples proposed for the DMA is expected to provide sufficient data upon which to apply the decision rule on the soil/sediment/solid waste and water analytical results for the DMA phase of the RI. Following evaluation of data generated during the DMA, appropriate modifications to the split-sampling program may be considered for the Phase 1A RI activities.

The Final DMA Work Plan (EPA 2012) shows the proposed locations for collecting surficial soil samples of solid media and water samples. In general, EPA will accept splits at the sample processing location, rather than the sample collection location; however, collection of sediment splits for VOC analyses will occur at the sampling location.

Samples of soil or other dry solid media will be collected as detailed in the applicable ERM SOPs, such as SOP USM-01, and samples of sediment that are either wet or fully saturated will be collected as detailed in SOP USM-02 (EPA 2012). Surface water samples will be collected in bulk, taking care to minimize disturbance of sediment.

In accord with the DQOs, the general plan for obtaining split samples of soils/sediments/solid wastes and water is to provide an EPA sample jar to ERM and have them fill the sample jar after all field sample processing has been completed. For VOCs in ditch sediments, EPA will provide

EnCore sampling devices to ERM for them to fill at the point of sample collection. For VOCs in water, EPA will provide sample jars to ERM for them to fill at the point of sample collection. EPA will not enter the ditches nor surface water.

Samples collected during the DMA will be representative of the full range of contaminant concentrations present at the Site. DMA split samples will be submitted to the CLP and commercial laboratories to be analyzed for the full suites of target analytes by the standard methods that have been identified for the DMA (see Worksheet #15). EPA split samples will not be collected for Focused HCB/IC analyses described in the Final DMA Work Plan (EPA 2012).

SECTION D: SAMPLING AND ANALYSIS

QAPP WORKSHEET #12-21

MEASUREMENT PERFORMANCE CRITERIA TABLE (QAPP WORKSHEET #12)

Measurement Performance Criteria Table – Oversight Split Field and Lab QC Samples

QC Sample	Analytical Group	Minimum Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
Soil/Sediment/Solid Waste					
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	PCB, PCDD/PCDF, SVOC, VOC, Metals	1 per analyses during DMA	Precision and Accuracy	Percent recovery 65-135%; RPD≤35%	S & A
Lab Duplicate[a]	PCB, PCDD/PCDF, SVOC, VOC, Metals,	1 per analyses during DMA	Precision	CLP Requirement: RPD≤25% for duplicate results. Also, see note a.	A
Lab Control Sample/Lab Control Sample Duplicate (LCS/LCSD)	PCB, PCDD/PCDF, SVOC, VOC, Metals	1 per analyses during DMA	Precision and Accuracy	Percent recovery 75-125%; RPD≤25%	A
Equipment Rinsate[b]	PCB, PCDD/PCDF, SVOC, VOC, Metals	0	Accuracy/ Contamination	NA	S
Source Blank[c]	PCB, PCDD/PCDF, SVOC, VOC, Metals	0	Accuracy/ Contamination	NA	S
Method Blank	PCB, PCDD/PCDF, SVOC, VOC, Metals	1 per laboratory batch	Accuracy/ Contamination	No Analyte ≥ QL	A
Trip Blank[d]	VOC	1 per cooler containing VOCs	Accuracy/ Contamination	No Analyte ≥ QL	S
Surface Water/Wastewater					
MS/MSD	PCB, PCDD/PCDF, SVOC, VOC, Metals, Anions, Alk., HAA, Perchlorate, CR6	1 per analyses during DMA	Precision and Accuracy	Percent recovery 70-130%; RPD≤30%	S & A

QC Sample	Analytical Group	Minimum Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
Lab Duplicate[a]	PCB, PCDD/PCDF, SVOC, VOC, Metals, Anions, Alk., HAA, Perchlorate, TOC, TSS, TDS,CR6 pH	1 per analyses during DMA	Precision	CLP Requirements: RPD≤25% for duplicate results. Also, see note a.	A
LCS/LCSD	PCB, PCDD/PCDF, SVOC, VOC, Metals, Anions, Alk., HAA, Perchlorate, CR6	1 per analyses during DMA	Precision and Accuracy	Percent recovery 75-125%; RPD≤25%	A
Equipment Rinsate[b]	PCB, PCDD/PCDF, SVOC, VOC, Metals, Anions, Alk., HAA, Perchlorate, CR6	0	Accuracy/ Contamination	NA	S
Source Blank[c]	PCB, PCDD/PCDF, SVOC, VOC, Metals, Anions, Alk., HAA, Perchlorate, CR6	0	Accuracy/ Contamination	NA	S
Method Blank	PCB, PCDD/PCDF, SVOC, VOC, Metals, Anions, Alk., HAA, Perchlorate, CR6	1 per laboratory batch	Accuracy/ Contamination	No Analyte ≥ QL	A
Trip Blank[d]	VOC	1 per cooler	Accuracy/ Contamination	No Analyte ≥ QL	S

Notes:

a. Final DMA Work Plan (EPA 2012) Requirements:

Laboratory Duplicate Results	Project-Specific Measurement Performance Criteria
Both Results > 5x the QL	Metals and TOC: RPD ≤ 35 All other analyses: RPD ≤ 50
Both Results < the QL	Both results < the QL (RPD not calculable)
Both Results < 5x the QL	Results within ± 2x the QL
One Result < the QL	Detected Result ≤ 2x the QL (RPD not calculable)

For both results > 5x the QL, the CLP requirements are more stringent than Final DMA Work Plan (EPA 2012) requirements, so meeting CLP requirements will be sufficient for that case.

b. Split sampling program equipment rinsate samples will not be collected during the DMA. No equipment is anticipated to be used as the samples will be provided by ERM.

c. Split sampling program source water blanks will not be collected during the DMA because the samples will be provided by ERM.

d. A trip blank demonstrates that contamination is not originating from sample containers or from any factor during sample transport. A trip blank originates at the laboratory as a 40-milliliter vial typically used for analysis of VOCs. The vial is filled at the laboratory with reagent-grade, organic-free water. The trip blanks are then transported to the Site with the empty containers that will be used for sample collection. The trip blanks are stored at the Site until the proposed field samples have been collected. One trip blank will accompany each sample transport container that holds water samples for analysis of VOCs back to the laboratory. The trip blank is not opened until it is returned to the laboratory.

SECONDARY DATA CRITERIA AND LIMITATIONS TABLE (QAPP WORKSHEET #13)

Secondary data is that information generated historically at the Site by past investigators or data from other sources that are relevant to the attainment of project objectives for which complete documentation may not be available. The integrity of secondary data used during the RI will be documented as it relates to the overall quality of decisions to be made at the Site.

Secondary data are not directly applicable to the split-sampling program for the DMA.

SUMMARY OF PROJECT TASKS (QAPP WORKSHEET #14)

As stated in QAPP Worksheet #11 (DQOs), the primary objective of the EPA oversight split-sampling program during the DMA investigation is to obtain data to evaluate the reproducibility of the data collected by ERM. The specific oversight activities anticipated by EPA during the DMA in order to achieve this objective are summarized below.

14.1 *PROJECT TASK OVERVIEW DURING THE DMA*

The following is a list of project tasks, which will be conducted by EPA during the DMA:

- Observe and document ERM sample collection activities in accord with the Final DMA Work Plan (EPA 2012)
- Observe and document ERM sample processing activities in accord with the Final DMA Work Plan (EPA 2012)
- Collect (accept) soil/sediment/solid waste and water split samples
- Analyze soil/sediment/solid waste and water split samples
- Verify and validate data
- Manage data and documents

The following sections briefly describe these tasks to be performed by EPA during the DMA.

14.2 SAMPLE COLLECTION AND PROCESSING, AND ANALYSES

The general approach for investigating the contaminants present in solids at the Site has been organized by PRI areas. PRI areas were designated by "disposal-type" areas and "non-disposal areas" (buffer zones) where contamination may have been distributed by natural dispersion or anthropogenic causes. In most cases some data are available from waste disposal areas, while in buffer zones little or no information is available. PRI areas are grouped based on geographic location, expected waste characteristics, and potential forces that may have acted to redistribute contaminants.

14.2.1 Soil/Sediment/Solid Waste Samples

A small group of surface soil/sediment/solid waste samples will be collected in selected PRI areas by ERM as described in the Final DMA Work Plan (EPA 2012). These surface samples will be collected from the top 6.0 inches of material. Sampling locations are shown in the Final DMA Work Plan (EPA 2012).

Surface soil/sediment/solid waste samples will be sieved, homogenized, and processed by ERM in accordance with the procedures identified in the Final DMA Work Plan (EPA 2012). EPA will accept split-samples in the field from the post-processed sample volume. The EPA samples for VOCs will be collected by ERM at the point of sample collection, and will not be processed.

Surface soil/sediment/solid waste samples samples will be analyzed through the EPA CLP and

commercial laboratories for the comprehensive list of chemicals identified in Worksheet #15. All EPA soil/sediment/solid waste samples collected during the DMA and associated laboratory sample extracts will be archived and may be re-analyzed any time up to a year after collection depending on the analytical suite.

14.2.2 Surface Water

Surface water samples will also be collected by ERM from the ditches, ponded waste lagoons, and a solar evaporation pond. EPA will observe collection of these samples from the nearest and best observation point, but will not accompany ERM at the sample collection point. PWT understands that ERM will collect bulk samples of water and then process (containerize, filter, etc.) the samples on solid ground. EPA will accept split-samples in the field from the bulk and post-processed sample volume, as applicable to the analytical suite.

Surface water samples will be analyzed for a comprehensive list of chemicals through the EPA CLP and commercial labs as identified in Worksheet #15. All surface water samples collected during the DMA will be archived and may be re-analyzed any time up to a year after collection or extraction, depending on the analytical suite and preservation steps employed.

14.3 *SUMMARY OF SURVEYS, INVESTIGATION-DERIVED WASTE, AND EQUIPMENT DECONTAMINATION*

ERM will be responsible for utility clearance and sample location surveys, equipment decontamination procedures, and management of investigation-derived waste (IDW) to be used for this investigation Subsurface utilities will be cleared by ERM at all PRI areas before intrusive field investigations begin. Per the Final DMA Work Plan, a State of Utah licensed land surveyor will survey the DMA sampling locations (EPA 2012).

All equipment will be decontaminated according to the following general procedures. All sampling tools will be decontaminated before sampling begins and between sample locations. Soil and groundwater sampling tools will be decontaminated by scrubbing in a solution of potable water and nonphosphate detergent (Alconox or Liquinox). The tools will then be double-rinsed with distilled water. Sampling tools that are not used immediately after decontamination will be allowed to air dry and stored appropriately. More specific equipment decontamination details are included in the Final DMA Work Plan (EPA 2012).

IDW, both soil and liquid, will be generated during this investigation. IDW will be handled by ERM in accordance with the procedures identified in the Final DMA Work Plan (EPA 2012). Soil IDW, PPE IDW, and liquid IDW will managed separately. Soil IDW will be stored in 55-gallon drums and PPE will be stored in separate 55-gallon drums. Liquid IDW, in the form of decontamination water and sampling water will also be contained in 55-gallon drums and will be properly labeled and staged. After the conclusion of the field program, IDW characterization samples will be collected by ERM for both the soil and liquid waste, and disposal alternatives will be evaluated.

14.4 DATA VALIDATION

Analytical data will be validated in accordance with current EPA National Functional Guidelines (EPA 2008, 2005b, 2004a). Validation procedures are detailed in Worksheet #36. Data validators must generate and submit data validation EDD's to EPA in accordance with the EPA CLP and EPA-approved Oversight Data Management Plan.

14.5 AUDITS

Independent technical systems and performance audits of field and laboratory activities may be conducted to assess whether sampling and analysis protocols conform to the criteria specified in this QAPP. The systems audit is a qualitative review of the overall sampling or measurement system, while the performance audit is a quantitative assessment of the measurement system, and includes both internal and external audits.

These audits may be used to help assess whether the resulting data meet the project-specific data quality objectives, to assess whether the data comply with QC criteria, and to identify the need for corrective action. The EPA Region 8 will implement their QA/QC program and may perform laboratory audits, as needed.

14.5.1 Field Performance and System Audits

Due to the short duration of the DMA split-sampling program, PWT does not anticipate conducting an audit of PWT Team field activities and procedures during the DMA. However, this section is provided as an outline of audit activities should they prove necessary.

The PWT Project Manager will have overall responsibility to ensure that the objectives of the project are met. The Field Team Lead will have direct responsibility for the field procedures to ensure they are conducted in accordance with this QAPP.

PWT's QAM, or her designee, may conduct internal audits during the 2012 field seasons of field activities to assess the performance and effectiveness of the existing quality management system in accordance with this QAPP. The intent of these audits is to identify, correct, and prevent problems that hinder the achievement of the project data quality objectives. If, during an assessment, the QAM determines that non-conformances are occurring that will seriously impact the usability of the data being collected, the QAM has the authority to stop work until the issues are resolved. If the QAM issues a stop work order to the PWT field sampling team, the Project Manager will be notified immediately so that the deficiencies may be resolved and work can recommence.

The audits may include examining field sampling records, log books and field sampling forms; sample collection, handling, storage, and transportation procedures, including organization and minimization of potential contamination sources; and chain-of-custody records and procedures.

After an internal audit is completed, a debriefing session will be held for participants to discuss the preliminary audit results. The auditor will prepare an audit evaluation report that includes observations of the deficiencies and the necessary recommendations for corrective actions. A draft audit evaluation report will be provided to the PWT Project Manager and the PWT RAC2

Program Manager within 10 days after the field or system performance audit is completed, and will be finalized no later than 30 days after the audit was performed. Conformance with the requirements presented in PWT's SOPs and this QAPP will be noted and nonconformance or deviations will be addressed through corrective or preventative actions identified by the QAM and the project team and approved by the Project Manager and the RAC2 Program Manager. Upon request, the audit evaluation report and any associated proposed corrective or preventative actions will be forwarded to the EPA RPM along with a time frame for implementation of corrective actions. Follow-up audits may be performed prior to completion of the project to ensure that corrective actions have been implemented appropriately and completely by the field team.

External field audits are the responsibility of EPA Region 8. Field audits may be conducted at any time during the field operations and will be based upon the information presented in this QAPP. The audits may or may not be announced, at the discretion of the auditing agency.

14.5.2 Laboratory Performance and System Audits

This QAPP includes analyses of samples by both CLP and commercial laboratories.

A variety of QA services are available to CLP data users in addition to data review and assessment activities. Monitoring and evaluation tools, including on-site audits, Gas Chromatography/Mass Spectrometry (GC/MS) tape audits, and Performance Evaluation (PE) samples assist in ensuring that only qualified laboratories participate in the CLP. Additionally, all CLP laboratories are subject to three types of audits. The laboratories are initially audited as part of the pre-award process and will be visited several times by authorized EPA personnel after contracts are awarded. The CLP QA and Technical Support contractor routinely performs random audits of CLP laboratory instrument data. Magnetic tape audits provide indications of data quality issues and support for on-site evaluations. CLP laboratories also participate in comparison PE sample studies as a means of measuring contract laboratory and method performance. These services ensure continuous improvement in the entire CLP process.

To verify proper implementation of laboratory procedures and adherence to this QAPP, the EPA Region 8 may perform an external audit of a CLP audit during this project. These audits may or may not be announced and will be conducted at the discretion of the auditing agency.

Commercial laboratories are required to have QA programs that meet EPA requirements, and follow EPA analytical method requirements and laboratory-specific SOPs. Laboratory-specific requirements are discussed in Section 14.6 of this Worksheet, and throughout this QAPP.

Audits, regardless of whether they are internal or conducted on a CLP or commercial laboratory may include review of method startup documentation and performance maintenance practices, including review of sample preparation, custody and data documentation, and analytical laboratory practices. Some examples of the types of laboratory-specific information that may be reviewed include, but may not be limited to:

- Sample processing procedures
- Sample custody procedures

- Sample disposal procedures and documentation
- Calibration procedures and documentation
- Detail regarding the analyses
- Completeness of data forms, notebooks, and other reporting requirements
- Data review and validation procedures
- Data reporting integrity and archiving, data storage, filing, and record keeping procedures
- QC procedures, tolerances, and documentation
- Operating conditions of facilities and equipment
- Documentation of training and maintenance activities
- Systems and operations overview
- Security of laboratory automated systems

Deficiencies and corrective action procedures will be reported to the EPA Laboratory Program Manager, the PWT Project Manager, and the EPA RPM. Any audit report will be included in the final project deliverables.

14.6 DOCUMENTS AND RECORDS

Documentation and consistent reporting is critical for evaluating the success of any environmental data collection activity. The information provided below is intended to provide a general overview of the data management process that EPA will follow as well as identify the documents and data that will be managed as part of the EPA split-sampling program. More specific details regarding how these deliverables must be formatted and reported are provided in the CLP Statements of Work and the Oversight Data Management Plan, included in this QAPP as Attachment 14A.

14.6.1 General Data Management Considerations

Field and analytical data collected from this project are critical to EPA oversight split-sampling program. An effective information management system is necessary to ensure efficient access to high quality data so that decisions can be made in a timely manner.

The EPA will manage all data and documents associated with all monitoring, sampling and analytical split-sampling activities in accordance with the EPA Oversight Data Management Plan. EPA will verify and enter these data and documents into the official database and document management system for the Site. These systems will also contain information for (1) summarizing observations on ERM's sample collection and processing activities, (2) preparing reports and graphics, and (3) distributing data to project personnel and stakeholders.

Field data, log books and other forms will document ERM and EPA split sample locations, field observations, monitoring results, significant events that occur during field activities and all deviations from the Final DMA Work Plan (EPA 2012) and this QAPP. EPA will provide electronic copies of field logs, notes and other field documentation to ERM on a daily basis during investigation activities. These deliverables must meet EPA reporting requirements as specified in the Oversight Data Management Plan.

All analytical laboratory data deliverables and reports will be sent directly from the laboratory to EPA. These laboratory data and documents will document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols and methods, nonconformity events, corrective measures, and/or data deficiencies. All laboratory data and documents will be reported to EPA in accordance with EPA's Oversight Data Management plan.

14.6.2 Field Documentation

Complete and accurate documentation is essential to demonstrate that field measurement and sampling procedures are carried out as described in this QAPP. Field personnel will use permanently bound field logbooks with sequentially numbered pages to record and document field activities. Each logbook will be assigned a unique identifier.

Logbooks will include, but may not be limited to, the following information. Specific data recording formats and parameters for logbooks are identified in EPA's Oversight Data Management Plan.

- Name and affiliation of all on-Site personnel or visitors
- Weather conditions during the field activity
- Summary of daily activities and significant events
- Notes of conversations with coordinating officials
- References to other field logbooks or forms that contain specific information
- Discussions of problems encountered and their resolution
- Discussions of deviations from the QAPP or other governing documents
- Photographs taken

The field team will also use the split-sampling form as specified in the Oversight Data Management Plan to record field activities.

14.6.3 Full Data Package

Full Level IV data packages are required from both the CLP and commercial laboratories. For the commercial laboratories, the laboratory will prepare data packages similar to those required in the EPA CLP SOWs.

Full data packages will contain all of the information from the summary data package and all associated raw data. Full data package requirements are outlined in Worksheet #29. Full data packages are due to EPA's contractor upon request within 35 days after the last sample in the sample delivery group (SDG) is received. Data must be retained by the laboratory for a minimum of 10 years, respectively, after final data have been submitted.

14.6.4 Lab Electronic Data Package Format

The subcontracted laboratories will provide an Electronic Data Deliverable (EDD) for all analytical results. An automated Laboratory Information Management System (LIMS) must be used to produce the EDDs. Manual creation of the deliverable (data entry by hand) is

unacceptable. The laboratory will verify EDDs internally before they are issued. The EDDs will correspond exactly to the hard-copy data. No duplicate data will be submitted.

EDDs will be delivered in a format compatible with the Superfund Staged Environmental Data Delivery (SEDD) format for import into EPA's official site information management system (http://www.epa.gov/superfund/programs/clp/sedd.htm). Results that should be included in all EDDs are as follows:

- Target analyte results for each sample and associated analytical methods requested on the chain-of-custody form
- Method and instrument blanks and preparation and calibration blank results reported for the SDG
- Percent recoveries for the spike compounds in the MS, MSD, blank spikes, or LCSs
- Matrix duplicate results reported for the SDG
- All re-analysis, re-extractions, or dilutions reported for the SDG, including any associated with samples and the specified laboratory QC samples.
- Electronic data must be retained for a minimum of 10 years after final data have been submitted. The subcontractor will use an electronic storage device capable of recording data for long-term storage. Raw data will be retained on an electronic data archival system. The EPA Region 8 Administrative Record will also retain a copy of all raw data.

14.6.5 Reports Generated

Results from EPA's DMA split-sampling program will be incorporated into an EPA DMA split-sampling data report. The report will include new analytical data collected under this program, comparison to ERM collected data, and evaluation of the reproducibility of the ERM data.

REFERENCE LIMITS AND EVALUATION TABLE (QAPP WORKSHEET #15)

Worksheet #15 is in Excel format and is therefore included as Attachment 15A.

PROJECT SCHEDULE / TIMELINE (WORKSHEET #16)

16.1 SUMMARY OF PROJECT SUBTASKS AND DELIVERABLES

The critical subtasks and deliverables for completing the oversight and split-sampling support for the Phase 1A DMA include the following:

- Review the EPA's Final DMA Work Plan (EPA 2012) and ERM's Health and Safety Plan (ERM 2012) for use in preparation of EPA's Site-Specific Plans
- Prepare the DMA Oversight HASP (PWT 2012)
- Prepare the DMA Oversight and Split-sampling QAPP, using to the extent possible, worksheets from the Final DMA Work Plan (EPA 2012)
- Coordinate laboratory analyses with the CLP and commercial laboratories
- Procure a commercial lab to analyze the non-CLP analytes
- Oversee the DMA field work conducted by ERM, including soil/sediment/solid waste and water sample collection, processing, and management.
- Reporting of field oversight observations and DMA oversight split-sample results.

16.2 PROJECT SCHEDULE

The DMA field work is currently scheduled to start Monday, October 1, 2012. ERM estimates that the field work planned for the DMA can be completed by Friday, October 5, 2012.

EPA's Site-Specific Plans, the DMA HASP and DMA Oversight and Split-sampling QAPP will be finalized and approved prior to initiating field work. The current planned schedule for approval is no later than September 26, 2012.

Coordination with the CLP and procurement of commercial laboratories is ongoing and will be completed no later than September 26, 2012.

The reporting of field observations will occur informally on a daily basis during the DMA field work. The report of field observations and split-sampling results will occur 30 days after the EPA and ERM analytical results have been validated and uploaded into the database.

SAMPLE COLLECTION (QAPP WORKSHEET #17)

This worksheet of the QAPP describes the oversight and split-sampling field activities and data collection for conducting soil/sediment/solid waste surface and water sampling for the DMA. Multiple laboratories may be used under EPA's CLP analytical program. EPA's *Contract Laboratory Program Guidance for Field Samplers* (EPA 2010) was consulted frequently during preparation of this QAPP and has been incorporated, as applicable.

17.1 SAMPLING PROCESS DESIGN

Worksheets #11 and #18 describe the sampling design and rationale in terms of the media that will be sampled, the analytical groups that will make up the analytical suite, the sampling methods and locations, and the number of samples to be collected.

The following subsections describe sample collection procedures and packaging and shipping procedures. General considerations pertaining to decontamination and investigation-derived waste (IDW) are also described. SOPs for the DMA Oversight Program conform to the requirements and guidelines of the EPA quality system, as established in EPA QA/G-6: "Guidance for Preparing Standard Operating Procedures" (2007), http://www.epa.gov/quality/qs-docs/g6-final.pdf.

17.2 SAMPLE COLLECTION PROCEDURES

The ERM field team will collect all samples. The general plan for obtaining split samples of soils/sediments/solid wastes and water is to provide an EPA sample jar to ERM and have them fill the sample jar after all field sample processing has been completed.

For VOCs in ditch sediments, an EnCore® sampler will be used to collect samples for analysis of VOCs according to EPA Method 5035. EPA will provide the EnCore sampling devices to ERM for them to use at the point of sample collection. The EnCore sampler will be deployed into undisturbed or minimally disturbed surface soil at each required sample location, or from a core sampling sleeve, and submitted for analysis.

The EPA/PWT team will accept the filled sample jars from ERM and prepare them for shipping.

17.3 SAMPLE PACKAGING AND SHIPPING

After acceptance, split soil samples will be managed in accordance with the project specific sampling handling requirements described in Worksheet#27 and.

Soil/sediment/solid waste and water samples will be packaged and shipped or hand delivered to the assigned CLP or commercial laboratory the day of collection if possible, but in any event, no later than within 24 hours of sample collection.

17.4 DECONTAMINATION

EPA/PWT personnel will not perform the actual sampling and will accept filled sample containers from the ERM field team. Therefore, no decontamination by EPA/PWT will be conducted for this project. If for some reason decontamination is necessary, ERM will decontaminate EPA/PWT personnel and equipment using the ERM decontamination equipment and protocols for the project, as described in Worksheet #14.

17.5 INVESTIGATION DERIVED WASTE MANAGEMENT

Sampling environmental media typically results in the generation of investigation derived waste. Handle and disposing of potentially contaminated soil and water will be the responsibility of the ERM sampling team. Used disposable personal protective equipment (PPE) will be generated by EPA/PWT and ERM field teams in the course of the proposed split-sampling program. Used disposable PPE generated by the EPA/PWT team will be managed and disposed of by the ERM field team.

SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE (QAPP WORKSHEET #18)

The media and samples shall be analyzed as indicated in this table for each PRI indicated.

Sample Type	Number of Sample Locations	Number of samples per location	Total Samples	Analytical Group (Method)[1]	Sampling and Sample Location Rationale[2]
SOIL/SEDIMENT/SOLID WASTE					
Surface soil/sediment/ solid waste	15	1	15	SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2), PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2), metals (EPA CLP SOW ISM01.3),	100% split samples of ERM samples
Saturated sediment in the ditches	2	1	2	VOCs (EPA CLP SOW SOM01.2)	100% split samples of ERM samples.
WATER					
Water	1	1	1	VOCs (EPA CLP SOW SOM01.2), SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2), PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2), metals[2] (EPA CLP SOW ISM01.3), Hexavalent Chromium (EPA 7196A), Perchlorate (EPA 6850), TDS (160.1), Alkalinity (EPA 310.1), Anions (EPA 300.0), haloacetic acids (EPA 552.2)	100% split samples of ERM samples
Wastewater (lagoons and ditches)	4	1	4	VOCs (EPA CLP SOW SOM01.2), SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2), PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2), metals[2] (EPA CLP SOW ISM01.3), Hexavalent Chromium (EPA 7196A), Perchlorate (EPA 6850), TDS (160.1), Alkalinity (EPA 310.1), Anions (EPA 300.0), haloacetic acids (EPA 552.2)	100% split samples of ERM samples

Notes:

VOCs	Volatile Organic Compounds
EPA	US Environmental Protection Agency
CLP	US EPA Contract Laboratory Program
SOW	Statement of Work
SVOCs	Semivolatile Organic Compounds
PCBs	Polychlorinated Biphenyls
PCDDs/PCDFs	Polychlorinated Dibenzo-p-dioxins/Polychlorinated Dibenzofurans

1 Metals for both soil and water samples include cyanide and mercury. Metals in surface water refer to total and dissolved metals. These two separate analyses for metals in surface water are not reflected in this worksheet.

2 See Worksheet #18 in Final DMA Work Plan (EPA 2012) for rationale of sample locations planned for collection by ERM.

ANALYTICAL SOP REQUIREMENTS TABLE (QAPP WORKSHEET #19)

Matrix	Analytical Group	Analytical and Preparation Method	Sample Container Size and Type	Number of Sample Containers / Required Sample Volume	Preservation Requirements	Maximum Holding Time (preparation / analysis)
Soil/Sediment/Solid Waste						
Soil/sed./ solids	PCBs	EPA CLP SOW CBC01.2	4 oz amber glass jars	One 4oz amber glass jar (incl. one additional 4 oz amber glass jar for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection	45 days
Soil/sed./ solids	PCDD/PCDF	EPA CLP SOW DLM02.2	4 oz amber glass jars	One 4 oz amber glass jar (incl. one additional 4 oz amber glass jar for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection	30 days for extraction and 45 days for analysis
Soil/sed./ solids	PAHs	EPA CLP SOW SM01.2 SIM	8 oz glass jar	One 8 oz glass jar (incl. one additional 8 oz glass jar for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection	14 days
Soil/sed./ solids	Semi-volatiles + NDMA	EPA CLP SOW SOM01.2 (Modified)	8 oz glass jar	One 8 oz glass jar (incl. one additional 8 oz glass jar for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection	14 days
Soil/sed./ solids	Metals + Hg, CN, Mo, and major cations	EPA CLP SOW ISM01.3	8 oz glass jar	One 8 oz glass jar (incl. one additional 8 oz glass jar for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection	6 months for all metals except Cyanide (14 days)
Soil/sed./ solids	Volatile Organic Compounds	EPA CLP SOW SOM01.2	5 gram En Core® samplers	Three 5 gram En Core® samplers (incl. six additional 5-gram En Core® samplers MS/MSD sample)	Frozen to (-7° C to -15° C) OR Iced to 4° C (±2°C)	14 days (preserved) OR 48 hours (unpreserved)

Matrix	Analytical Group	Analytical and Preparation Method	Sample Container Size and Type	Number of Sample Containers / Required Sample Volume	Preservation Requirements	Maximum Holding Time (preparation / analysis)
Water						
Water	PCB	EPA CLP SOW CBC01.2	1 L amber glass bottle	One 1 L amber glass bottle and one additional 1 L amber glass bottle for MS/MSD sample	Cool sample to 4°C (±2°C) immediately after collection.	45 days
Water	PCDD/PCDF	EPA CLP SOW DLM02.2	1 L amber glass bottle	One 1 L amber glass bottle and one additional 1 L amber glass bottle for MS/MSD sample	Cool sample to 4°C (±2°C) immediately after collection.	30 days for extraction and 45 days for analysis
Water	PAHs	SM01.2 SIM	1 L amber glass bottle	Two 1 L amber glass bottles (incl. 4 additional 1 L amber glass bottles MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection.	7 days
Water	Semi-volatiles + NDMA	EPA CLP SOW SOM01.2 (Modified)	1 L amber glass bottle	Two 1 L amber glass bottles (incl. 4 additional 1 L amber glass bottles for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection.	7 days
Water	Volatile Organic Compounds	EPA CLP SOW SOM01.2	40 mL amber glass vial	Three 40 mL vials (incl. 6 additional 40 ml vials for MS/MSD sample)	Preserve to a pH of 2 with HCl and cool sample to 4°C (±2°C) immediately after collection	14 days
Water	Metals (Total) + Hg, CN, Mo, and major cations	EPA CLP SOW ISM01.3	1 L HDPE bottle for metals, Hg, Mo; 1 liter HDPE bottle for CN	One 1 L HDPE bottle for metals, Hg, Mo (incl. one additional 1 L HDPE bottle for MS/MSD sample); One 1 L HDPE bottle CN (incl. one additional 1 L HDPE bottle for MS/MSD sample)	Acidify to pH < 2 with HNO3 and cool sample to 4°C (±2°C) immediately after collection (NaOH for CN)	6 months for all metals except Mercury (28 days) and Cyanide (14 days)

Matrix	Analytical Group	Analytical and Preparation Method	Sample Container Size and Type	Number of Sample Containers / Required Sample Volume	Preservation Requirements	Maximum Holding Time (preparation / analysis)
Water	Metals (Dissolved) + Hg, CN, Mo, and major cations	EPA CLP SOW ISM01.3	1 L HDPE bottle for metals, Hg, Mo; 1 liter HDPE bottle for CN	One 1 L HDPE bottle for metals, Hg, Mo (incl. one additional 1 L HDPE bottle for MS/MSD sample); One 1 L HDPE bottle CN (incl. one additional 1 L HDPE bottle for MS/MSD sample)	Acidify to pH < 2 with HNO3 and cool sample to 4°C (±2°C) immediately after collection	6 months for all metals except Mercury (28 days) and Cyanide (14 days)
Water	Haloacetic Acids	EPA Method 552.2	250 mL amber glass bottle	One 250 mL amber glass bottle (incl. one additional 250 mL amber glass bottle for MS/MSD sample)	Acidify to pH < 2 with NH_4Cl, and cool sample to 4°C (±2°C) immediately after collection	14 days
Water	Perchlorate	EPA Method 6850	125 mL polyethylene bottle	Two 125 mL polyethylene bottles (incl. two additional 125 mL polyethylene bottles for MS/MSD sample)	Filter; Protect from temp. extremes	28 days
Water	Anions	EPA Method 300.0	500 mL HDPE bottle	One 500 mL HDPE bottle (incl. one additional 500 mL HDPE bottle for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection.	48 hours (nitrate and nitrite); 28 days (others)
Water	Alkalinity	EPA Method 310.1	250 mL HDPE bottle	One 250 mL HDPE bottle (incl. one additional 250 mL HDPE bottle for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection.	14 days
Water	Total Dissolved Solids	EPA Method 160.1	250 mL polyethylene bottle	One 250 mL polyethylene bottle (incl. one additional 250 mL polyethylene bottle for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection.	7 days

Matrix	Analytical Group	Analytical and Preparation Method	Sample Container Size and Type	Number of Sample Containers / Required Sample Volume	Preservation Requirements	Maximum Holding Time (preparation / analysis)
Water	Hexavalent Chromium	EPA Method 7196A	250 mL amber glass bottle	One 250 mL amber glass bottle (incl. one additional 250 mL amber glass bottle for MS/MSD sample)	Cool sample to 4°C (±2°C) immediately after collection.	24 hours

Notes:

EPA	U.S. Environmental Protection Agency
CLP	Contract Laboratory Program
SOW	Statement of Work
L	Liter
mL	Milliliter
oz	Ounce
PCBs	Polychlorinated Biphenyls
PCDDs/PCDFs	Polychlorinated Dibenzo-p-dioxins/Polychlorinated Dibenzofurans
PAHs	Polycyclic aromatic hydrocarbons
SVOCs	Semi-volatile Organic Compounds
VOCs	Volatile Organic Compounds
MS/MSD	Matrix Spike and Matrix Spike Duplicate
HDPE	High-density polyethylene

FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE (QAPP WORKSHEET #20)

Matrix	PRI Areas	Analytical Group (Method)[a]	No. of Samples Collected	No. of Field Duplicates	No. of Project-Specific MS/MSDs[b]	No. of Equip. Blanks[c]	No. of Trip Blanks[d]	Total No. of Samples
Soil/sediment/solid waste								
Soil	PRI 5 SE Active Waste Pond * PRI 6 NW Active Waste Pond PRI 15 Buffer Area – Alluvial Upland	All Analytical Groups with exception of VOCs	3	0	0/0	0	0	3
Exposed Sediment	PRI 5 SE Active Waste Pond PRI 7 Inactive Waste Pond	All Analytical Groups with exception of VOCs	2	0	0/0	0	0	2
Saturated Sediment	PRI 1 Ditches * (2 samples)	All Analytical Groups	2	0	1/1	0	1	4
Submerged Sediment	PRI 5 SE Active Waste Pond * PRI 6 NW Active Waste Pond PRI 7 Inactive Waste Pond PRI 14 Buffer Area SE (Solar Pond 1N)	All Analytical Groups with exception of VOCs	4	0	0/0	0	0	4
Solid Waste	PRI 4 Gypsum Pile * (2 samples) PRI 9 Smut Piles (2 samples)	All Analytical Groups with exception of VOCs	4	0	0/0	0	0	4
Water/Wastewater								
Surface Water	PRI 14 Buffer Area SE (Solar Pond 1N)	All Analytical Groups	1	0	0	0	1	2
Wastewater	PRI 1 Ditches * PRI 5 SE Active Waste Pond PRI 6 NW Active Waste Pond PRI 7 Inactive Waste Pond*	All Analytical Groups	4	0	1/1 collected from Ditch sample	0	2	8

Notes:

a Refer to Worksheet #12.

b This table shows the number of matrix spike/matrix spike duplicate samples to be collected for MS/MSDs to be run on project-specific samples. However, MS/MSDs will be run on every batch for each analyses.

c Split-sampling will not require equipment blanks/rinsates.

d The number of trip blanks is estimated; and is determined as one per cooler containing VOCs, as indicated in Worksheet #12.

PROJECT SAMPLING SOP REFERENCES TABLE (QAPP WORKSHEET #21)

See the Final DMA Work Plan (EPA 2012) for ERM's SOPs. Split-sampling procedures are described elsewhere in this QAPP, particularly WS #s 11, 14, 17, and 27, and are sufficiently complete that SOPs are not required.

*SOP Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
Not Applicable					

SECTION E: QUALITY ASSURANCE

QAPP WORKSHEET #22-37

FIELD EQUIPMENT CALIBRATION, MAINTENANCE, TESTING, AND INSPECTION TABL (QAPP WORKSHEET #22)

Field Equipment	Parameters Measured	Activity	Frequency	Acceptance Criteria	Corrective Action	Resp. Person	SOP Reference
RAE Systems MultiRAE Portable Six-Gas Monitor	VOCs / LEL / CO / 0^2 / Cl_2	Calibration	Once per day for VOCs / LEL / CO / 0^2 sensors Once per month for Cl_2 sensor	Per manufacturer's instructions	Recalibrate, recharge battery	Equipment rental company and field team lead	Manufacturer's SOP
Interscan Portable Gas Analyzer Model 4360 HCL	HCL gas	Calibration	Once per 6 months	Per manufacturer's instructions	Recalibrate, recharge battery	Equipment rental company and field team lead	Manufacturer's SOP
TSI DUSTTRAK II Aerosol Monitor 8520	Aerosol (dust)	Calibration	Annually	Per manufacturer's instructions	Recalibrate, recharge battery	Equipment rental company and field team lead	Manufacturer's SOP

ANALYTICAL SOP REFERENCES TABLE (QAPP WORKSHEET #23)

Laboratory SOP Number	Title, Revision Date, and Number[a]	Definitive (D) or Screening (S) Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
Soil/Sediment/Solid Waste						
NA	EPA CLP SOW CBC01.2	D	PCB	HRGC/HRMS	SGS North America	N
NA	EPA CLP SOW DLM02.2	D	PCDD/PCDF	HRGC/HRMS	SGS North America	N
NA	EPA CLP SOW SOM01.2	D	SVOC+NDMA	GC/MS	KAP Technologies	N
NA	EPA CLP SOW SOM01.2-SIM	D	SVOC (PAH) SIM	GC/MS	KAP Technologies	
NA	EPA CLP SOW SOM01.2	D	VOC	GC/MS	KAP Technologies	N
NA	EPA CLP SOW ISM01.3	D	Metals+Hg+Mo+CN	ICP	Chem Tech	N
Water						
NA	EPA CLP SOW CBC01.2	D	PCB	HRGC/HRMS	SGS North America	N
NA	EPA CLP SOW DLM02.2	D	PCDD/PCDF	HRGC/HRMS	SGS North America	N
NA	EPA CLP SOW SOM01.2	D	SVOC+NDMA	GC/MS	KAP Technologies	N
NA	EPA CLP SOW SOM01.2-SIM	D	SVOC (PAH) SIM	GC/MS	KAP Technologies	
NA	EPA CLP SOW SOM01.2	D	VOC	GC/MS	KAP Technologies	N
NA	EPA CLP SOW ISM01.3	D	Metals +Hg+Mo+CN (Dissolved)	ICP	Chem Tech	N
NA	EPA CLP SOW ISM01.3	D	Metals +Hg+Mo+CN (Total)	ICP	Chem Tech	N
Requested	EPA OW Method 552.2	D	Haloacetic Acids	GC	ALS Laboratory Group	N
LC/MS-CLO4	EPA SW-846 Method 6850	D	Perchlorate	LC/MS/MS	ALS Laboratory Group	N
IC-EP-300.0	EPA OW Method 300.0	D	Anions	IC	ALS Laboratory Group	N
IC-EP-310.1	EPA OW Method 310.1	D	Alkalinity	WC	ALS Laboratory Group	N
IW-EP-160.1	EPA OW Method 160.1	D	Total Dissolved Solids	Gravimetry	ALS Laboratory Group	N
SC-SW-7196	EPA SW-846 Method 7196A	D	Hexavalent Chromium	IC or IC/ICP/MS	ALS Laboratory Group	N

Note: a. This column list EPA reference methods that will be the basis for the methods and analytical SOPs applied in the Phase 1 RI. Laboratory SOPs should provide data that are equivalent in quality and defensibility to the listed methods.

ANALYTICAL INSTRUMENT CALIBRATION TABLE (QAPP WORKSHEET #24)

See Worksheet #24 in the Final DMA Work Plan (EPA 2012). For analyses through the CLP, instrument calibration will be in accordance with the CLP SOW.

ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE (QAPP WORKSHEET #25)

See Worksheet #25 in the Final DMA Work Plan (EPA 2012). For analyses through the CLP, instrument and equipment maintenance will be in accordance with the CLP SOW.

SAMPLE HANDLING SYSTEM (QAPP WORKSHEET #26)

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Pacific Western Technologies, Ltd; Aaron Baird
Sample Packaging (Personnel/Organization): Pacific Western Technologies, Ltd; Aaron Baird
Coordination of Shipment (Personnel/Organization): Pacific Western Technologies, Ltd; Aaron Baird
Type of Shipment/Carrier: Overnight Carrier
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Laboratory Sample Custodian
Sample Custody and Storage (Personnel/Organization): Laboratory Sample Custodian
Sample Preparation (Personnel/Organization): Laboratory Analyst
Sample Determinative Analysis (Personnel/Organization): Laboratory Analyst
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): 365 days
Sample Extract/Digestate Storage (No. of days from extraction/digestion): Dependent on analyses
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Laboratory
Number of Days from Analysis: 365 days

SAMPLE CUSTODY REQUIREMENTS (QAPP WORKSHEET #27)

EPA/PWT will follow general custody procedures similar to those presented below.

27.1 SAMPLE HANDLING AND CUSTODY

The following sections describe sample handling procedures, including sample identification (ID) and labeling, documentation, chain of custody, and shipping.

27.1.1 Sample Identification

Samples will be identified through the use of a coding system to identify sample locations and sample types. The coding system will ensure that samples are uniquely identified by sample number and provide tracking numbers to facilitate data retrieval. PWT will use the following identification numbering scheme for each EPA split sample.

Sample Number: DMA-Gyp-PRI04-1 –ES-S-1001

ERM Sample:	DMA-Gyp-PRI04-1
Sample Type:	ES = EPA (E) split sample (S)
Matrix Type:	S = Soil SE = Sediment, Exposed SS = Sediment, Submerged or Saturated SW = Solid Waste W = Surface Water WW = Wastewater
Designation:	Sequential sample number within each PRI: PRI 1: 1001-1999 PRI 2: 2001-2999 PRI 3: 3001-3999, etc.

In addition, the CLP program will assign CLP sample identification numbers for samples being analyzed through their program.

No field duplicate samples will be collected during the DMA. Matrix spike (MS) and matrix spike duplicate (MSD) samples will not be identified in the sample number, but extra volume will be collected and the chain of custody provided to the laboratory will indicate the samples which should be used for MS/MSD analysis. Extra volume for MS/MSD analysis will be collected at a frequency of 1 per 20 investigative samples for thes oil/sediment/waste and water matrices. In the case of fewer than 20 samples, a MS/MSD will still be collected. Sample numbers will be recorded in field log books, on the chain of custody, and on the field sample location map.

QC samples for this investigation will also be assigned specific sample IDs. No source water or equipment rinsate samples will be collected as part of the split-sampling program; therefore, trip

blanks will be the only QC sample collected/analyzed during the DMA. The following identification numbering scheme will be used for each trip blank sample:

Trip Blank: TB01 through TBxx

27.1.2 Sample Labels

Sample labeling will be completed in accordance with PWT's SOP for Sample Handling, PWT-ENSE-406, Rev 2, 03/1/2012. Sample labels will be completed using waterproof ink and attached to the sample containers at the time each sample is collected. The following information will be included on the sample label:

- Company's name
- Project name and location
- PWT sample identification numbers, and for CLP samples, CLP-assigned identification numbers
- AR representative that relinquished the sample
- Date and time of sample collection
- Preservative (if applicable)
- Analyses required
- Sample Matrix
- Sampler's name or initials

After each sample is labeled, it will be refrigerated or placed in a cooler that contains ice to maintain the sample temperature at 4 ± 2 °C.

27.1.3 Sample Documentation

Documentation during sampling is essential to ensure proper sample identification. Field personnel will adhere to the following general guidelines for maintaining field documentation:

- Documentation will be completed in permanent black ink
- All entries will be legible
- Errors will be corrected by crossing out with a single line and then dating and initialing the lineout
- Any serialized documents will be maintained in the project file and referenced in a Site logbook
- Unused portions of pages will be crossed out, and each page will be signed and dated.
- Documentation of split sample collection shall include corresponding ERM sample identification number

- Use of field sample forms

27.1.4 Chain of Custody

To ensure that samples are identified correctly and remain representative of the environment, careful sample documentation and custody procedures will be used to maintain and document sample integrity during collection, transportation, storage, and analysis.

The project team will use standard sample custody procedures to maintain and document sample integrity during collection, transportation, storage, and analysis. A sample will be considered to be in custody if one of the following statements applies:

- It is in an authorized person's physical possession or view
- It is in a secure area with restricted access
- It is placed in a container and secured with an official seal such that the sample cannot be reached without breaking the seal.

Chain-of-custody procedures provide an accurate written record that traces the possession of individual samples from the time they are collected in the field to the time they are accepted at the laboratory. The chain-of-custody record will also be used to document all samples collected and the analyses requested. Information that the field personnel will record on the chain-of-custody record includes the following:

- Project name and number
- PWT Sample ID number, and, in addition, CLP sample ID numbers if assigned
- Sampling location
- Sample matrix (i.e., soil, water)
- Name and signature of sampler
- Destination of samples (laboratory name)
- Date and time of collection
- Number and type of containers filled
- Analysis requested
- Preservatives used (if applicable)
- Filtering (if applicable)
- Sample designation (grab or composite)
- Signatures of individuals involved in custody transfer, including the date and time of transfer
- Airbill number (if applicable)
- Project contact and phone number.

Unused lines on the chain-of-custody record will be crossed out. Field personnel will sign chain-of-custody records that are initiated in the field, and the airbill number will be recorded. The record will be inserted in a waterproof plastic bag and taped to the inside of the shipping container used to transport the samples. Signed airbills will serve as evidence of custody transfer between field personnel and the courier, and between the courier and the laboratory. Copies of the chain-of-custody record and the airbill will be retained and filed by field personnel before the containers are shipped.

Laboratory chain of custody begins when samples are received and continues until samples are discarded. Laboratories analyzing samples for EPA must follow custody procedures at least as stringent as those required by the EPA CLP SOWs. The laboratory should designate a specific individual as the sample custodian. The custodian will receive all incoming samples, sign the accompanying custody forms, and retain copies of the forms as permanent records. Each chain-of-custody will be verified for accuracy and completeness, and any discrepancies will be brought to the attention of EPA/PWT. The laboratory sample custodian will record all pertinent information on the samples, including the persons who delivered the samples, the date and time received, sample condition at the time of receipt (sealed, unsealed, or broken container; temperature; or other relevant remarks), the sample ID numbers, and any unique laboratory ID numbers for the samples. This information should be entered into a computerized laboratory information management system (LIMS). When the sample transfer process is complete, the custodian is responsible for maintaining internal logbooks, tracking reports, and other records necessary to maintain custody throughout sample preparation and analysis.

The laboratory will provide a secure storage area for all samples. Access to this area will be restricted to authorized personnel. The custodian will ensure that samples that require special handling, including samples that are heat- or light-sensitive, radioactive, or have other unusual physical characteristics, will be properly stored and maintained prior to analysis. Following sample analysis, any remaining sample material for all samples (100 percent) will be archived by the laboratory until instructed to dispose of the sample. The laboratory will be responsible for sample disposal, which will be conducted in accordance with all applicable local, state, and federal regulations. Disposal of all samples will be documented. The laboratory will maintain records in the project file.

27.1.5 Sample Packaging and Shipping

The following procedures will be implemented when samples collected during this project are shipped.

- Sample containers will be placed in plastic re-sealable bags and placed upright in coolers.
- The cooler will be filled with bubble wrap, sample bottles, and packing material. Sufficient packing material will be used to prevent sample containers from shifting or breaking during shipment.
- Enough ice will be added to maintain the sample temperature at 4 ± 2 °C. The laboratory will measure the temperature by laser upon receipt.
- The signed original copy of the completed chain-of-custody records will be placed inside a plastic bag. The bag will be sealed and taped to the inside of the cooler lid.

- The air bill, if required, will be filled out before the samples are handed over to the carrier. The laboratory will be notified if the sampler suspects that the sample contains any substance that would require laboratory personnel to take safety precautions.

- The cooler will be closed and taped shut with strapping tape around both ends. If the cooler has a drain, it will be taped shut both inside and outside of the cooler.

- Signed and dated custody seals will be affixed on the front and side of each cooler. Wide clear tape will be placed over the seals to prevent accidental breakage.

- When the cooler is received at the analytical laboratory, laboratory personnel will open the cooler and sign the chain-of-custody record to document transfer of samples. Multiple coolers may be sent in one shipment to the laboratory. The outside of the coolers will be marked to indicate the number of coolers in the shipment.

- A copy of the signed chain-of-custody record and the completed waybill will be retained for the project files.

LABORATORY QC SAMPLES TABLE (QAPP WORKSHEET #28)

Matrix	Soil/Water
Analytical Group	PCBs
Analytical Method / SOP Reference	CLP SOW CBC01.2 (HRGC/HRMS)

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Persons Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per extraction batch (20 samples)	No Target Compounds>CRQL	Per CLP SOW CBC01.2	Laboratory Analyst	Accuracy/Bias-Contamination	See Worksheet #12
LCS	One per extraction batch (20 samples)	CLP SOW CBC01.2, Exhibit D, Table 6	Per CLP SOW CBC01.2	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
Internal Standards	Spiked into every sample and QC sample	Labeled compound recoveries per CLP SOW CBC01.2	Per CLP SOW CBC01.2	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
MS/MSD	One per extraction batch (20 samples)	CLP SOW CBC01.2,	Per CLP SOW CBC01.2	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Soil/Water
Analytical Group	PCDDs/PCDFs
Analytical Method / SOP Reference	CLP SOWs DLM02.2 (HRGC/HRMS)

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Persons Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per extraction batch (20 samples)	No Target Compounds>CRQL (>3XCRQL for OCDD)	Per CLP SOW DLM02.2	Laboratory Analyst	Accuracy/Bias-Contamination	See Worksheet #12
LCS	One per extraction batch (20 samples)	CLP SOW DLM02.2, Exhibit D, Table 6	Per CLP SOW DLM02.2	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
Internal Standards	Spiked into every sample and QC sample	Labeled compound recoveries per CLP SOW DLM02.2, Exhibit D, Table 7	Per CLP SOW DLM02.2	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
MS/MSD	As per client request	Per CLP SOW DLM02.2	Per CLP SOW DLM02.2	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Soil/Water
Analytical Group	SVOCs
Analytical Method / SOP Reference	CLP SOW SOM01.2

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤CRQLs	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias - Contamination	See Worksheet #12
LCS	One per sample preparation batch	Per CLP SOW SOM01.2	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
Internal Standards	Spiked into every sample and QC sample	AREA UPPER LIMIT = 200% of internal standard area in CCV AREA LOWER LIMIT = 50% of internal standard area in CCV	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias	AREA UPPER LIMIT = 200% of internal standard area in CCV AREA LOWER LIMIT = 50% of internal standard area in CCV
Surrogates	Spiked into every sample and QC sample	CLP SOW SOM01.2, Exhibit D, Table 6	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias	CLP SOW SOM01.2, Exhibit D, Table 6
MS/MSD	Will be designated in the field	CLP SOW SOM01.2, Exhibit D, Table 5	Per CLP SOW SOM01.2	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Soil/Water
Analytical Group	VOCs
Analytical Method / SOP Reference	CLP SOW SOM01.2

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤CRQLs	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias - Contamination	See Worksheet #12
LCS	One per sample preparation batch	Per CLP SOW SOM01.2	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
Internal Standards	Spiked into every sample and QC sample	AREA UPPER LIMIT = 200% of internal standard area in CCV AREA LOWER LIMIT = 50% of internal standard area in CCV	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias	AREA UPPER LIMIT = 200% of internal standard area in CCV AREA LOWER LIMIT = 50% of internal standard area in CCV
Surrogates	Spiked into every sample and QC sample	CLP SOW SOM01.2, Exhibit D, Table 5	Per CLP SOW SOM01.2	Laboratory Analyst	Accuracy/Bias	CLP SOW SOM01.2, Exhibit D, Table 5
MS/MSD	Will be designated in the field	CLP SOW SOM01.2, Exhibit D, Table 6	Per CLP SOW SOM01.2	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Water/Soil
Analytical Group	Metals
Analytical Method / SOP Reference	CLP SOW ISM01.3

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method (preparation) Blank	One per preparation batch	All analytes $\leq$ CRQL	Per CLP SOW ILM01.3	Laboratory Analyst	Accuracy/Bias-Contamination	See Worksheet #12
LCS	One per preparation batch	All analytes 80-120%	Per CLP SOW ILM01.3	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
MS/MSD or MS/MD	One per preparation batch	All analytes 75-125%	Per CLP SOW ILM01.3	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12
Dilution Test	One per sample preparation batch	1:5 dilution must agree within + 10% of the original determination	Per CLP SOW ILM01.3	Laboratory Analyst	Accuracy/Bias (matrix interference)	1:5 dilution must agree within + 10% of the original determination
Instrument QC checks (ICS, CRQL check, linear range check)	Per ILM05.4, Exhibit D, Section 12	Per ILM01.3, Exhibit D, Section 12	Per CLP SOW ILM01.3	Laboratory Analyst	Accuracy/Bias - Precision	Per ILM05.4, Exhibit D, Section 12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Water
Analytical Group	Hexavalent Chromium
Analytical Method / SOP Reference	EPA Method 7196A SOP ALS: SC-SW-7196

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Persons Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per prep batch of <20 samples	No contamination >RL	Re-run if still contaminated re-extract all samples associated with the blank	Laboratory analyst	Contamination	No Target Compounds>RL
LCS	One per prep batch of </=20 samples	Per method/SOP	If the recovery is out high and no positive results in the sample no corrective action is required. If the recovery is low then re-run if still low re-extract all samples associated with the LCS	Laboratory analyst	Accuracy/Bias-Contamination	See Worksheet #12
LCSD	One per prep batch of </=20 samples	Per method/SOP	If the recovery is out high and no positive results in the sample no corrective action is required. If the recovery is low then re-run if still low re-extract all samples associated with the LCS	Laboratory analyst	Accuracy/Bias-Contamination	See Worksheet #12
MS	One per batch of </=20 samples	Per method/SOP	If LCS/LCSD meets the criteria then no corrective action is required	Laboratory analyst	Accuracy/Bias-Contamination	See Worksheet #12
MSD	One per batch of </=20 samples	Per method/SOP	If LCS/LCSD meets the criteria then no corrective action is required	Laboratory analyst	Accuracy/Bias-Contamination	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Water
Analytical Group	Perchlorate
Analytical Method / SOP Reference	EPA Method 6850/ (IC) SOP ALS: LC/MS-CLO4

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Persons Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per extraction batch (20 samples)	No contamination >RL	1) Run an instrument blank (or system blank). 2) Asses impact on data. 3) Reanalyze method blank 4) Reprep batch as necessary	Laboratory Analyst	Accuracy/Bias-Contamination	See Worksheet #12
LCS	One per extraction batch (20 samples)	Per method/SOP	1) Check calculations. 2) If sufficient sample is available, re-extract and reanalyze samples. 3) If insufficient sample is available, reanalyze extracts. Qualify data as needed.	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
Synthetic Matrix Control Sample	One per extraction batch (20 samples)	Per method/SOP	1) Evaluate system and correct problem. 2) Reanalyze associated samples.	Laboratory Analyst	Accuracy/Bias-Contamination	See Worksheet #12
MS/MSD	One per extraction batch (20 samples)	Per method/SOP	1) Check calculations. 2) Evaluate all data. 3) Assess impact and qualify data. 4) Reanalyze once and include in the narrative.	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Water
Analytical Group	HAA
Analytical Method / SOP Reference	EPA 552.2/ SOP ### Requested

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Persons Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes $\leq$ RLs	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	See Worksheet #12
LCS	One per sample preparation batch	Per method/SOP	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
Surrogates	Spiked into every sample and QC sample	Per method/SOP	Reprep and reanalyze samples, or assess the effects of interferences or dilution	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
MS/MSD	As per client request (See chain of custody)	Per method/SOP	If result indicates matrix interference, discuss in case narrative. Otherwise, check for possible source of error, and re-extract/reanalyze the sample.	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Water
Analytical Group	Major Anions
Analytical Method / SOP Reference	EPA 300.0 / SOP ALS: IC-EP-300.0

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <RLs	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/bias-contamination	See Worksheet #12
LCS	One in the absence of MS/MD	% Recovery 80-120	Reprep and reanalyze LCS and all samples processed with non-conforming LCS	Laboratory Analyst	Accuracy/bias	See Worksheet #12
MS	Will be designated in the field	% Recovery 75-125 RPD ± 20%	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/bias	See Worksheet #12
MD	Will be designated in the field	RPD ± 20%	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/bias-precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Water
Analytical Group	Alkalinity
Analytical Method / SOP Reference	EPA 310.1 / SOP ALS: IC-EP-310.1

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <RLs	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/bias-contamination	See Worksheet #12
LCS	One in absence of MS/MSD	% Recovery 80-120	Reprep and reanalyze LCS and all samples processed with non-conforming LCS	Laboratory Analyst	Accuracy/bias	See Worksheet #12
MS/MSD	Will be designated in the field	% Recovery 75-125 RPD ± 20%	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/bias - precision	See Worksheet #12

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

Matrix	Water
Analytical Group	TDS/TSS
Analytical Method / SOP Reference	EPA 160.1-2 / SOP ALS: IW-EP-160.1

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	≤10 mg/L	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	See Worksheet #12
LCS	One per sample preparation batch	80-120% Recovery	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	See Worksheet #12
MD	As per client request (See chain of custody)	RPD < 5%	If result indicates matrix interference, discuss in case narrative. Otherwise, check for possible source of error, and re-extract/reanalyze the sample.	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	See Worksheet #12

Notes:

CCV	Continuing Calibration Verification
CLP	US EPA Contract Laboratory Program
CRQL	Contract required quantitation limit
EPA	US Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
HCB	Hexachlorobenzene
HRGC	High Resolution Gas Chromatography
HRMS	High Resolution Mass Spectrometry
IC	Ion Chromatography
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
LC	Liquid Chromatography
LCS	Laboratory control sample
MB	Method blank
MS	Matrix spike
MSD	Matrix spike duplicate
NA	Not applicable
ND	Not Detected

LABORATORY QC SAMPLES TABLE (CONTINUED) (QAPP WORKSHEET #28)

NDMA	N-nitrosodimethylamine
OCDF	Octachlorodibenzofuran
OW	Office of Water
PCBs	Polychlorinated Biphenyls
PCDDs/PCDFs	Polychlorinated Dibenzo-p-dioxins/Polychlorinated Dibenzofurans
PUF	Polyurethane foam
QL	Quantitation limit
RL	Reporting limit
RPD	Relative percent difference
S/N	Signal to Noise
SOW	Statement of Work
SVOCs	Semivolatile Organic Compounds
SW-846	EPA solid waste test methods manual (www.epa.gov/sw-846)
VOCs	Volatile Organic Compounds
WS	Worksheet

PROJECT RECORDS AND DOCUMENTATION (QAPP WORKSHEET #29)

Requirements for Data Packages – Organic Analysis	Requirements for Data Packages – Inorganic Analysis
Summary (Level III)	**Summary (Level III)**
Section I Case Narrative	**Section I Case Narrative**
1. Case narrative	1. Case narrative
2. Copies of nonconformance and corrective action forms	2. Copies of nonconformance and corrective action forms
3. Chain-of-custody forms	3. Chain-of-custody forms
4. Copies of sample receipt notices	4. Copies of sample receipt notices
5. Internal tracking documents, as applicable	5. Internal tracking documents, as applicable
Section II Sample Results – Form I for the following:	**Section II Sample Results – Form I for the following:**
1. Environmental samples, including dilutions and re-analysis, reported on a dry-weight basis	1. Environmental samples, including dilutions and re-analysis, reported on a dry-weight basis
Section III Quality Assurance/Quality Control (QA/QC) Summaries – Forms II through XI for the following:	**Section III QA/QC Summaries – Forms II through XIV for the following:**
1. System monitoring compound and surrogate recoveries (Form II)	1. Initial and continuing calibration verifications (Form II)
2. Matrix spike (MS) and matrix spike duplicate (MSD) recoveries and relative percent differences (RPD) (Forms I and III)	2. Project-required reporting limit (PRRL) standard (Form II)
3. Blank spike or laboratory control sample (LCS) recoveries (Forms I and III-Z)	3. Detection limit standard (Form II-Z)
4. Method blanks (Forms I and IV)	4. Method blanks, continuing calibration blanks, and preparation blanks (Form III)
5. Performance check (Form V)	5. Inductively coupled plasma (ICP) interference-check samples (Form IV)
6. Initial calibrations with retention time information (Form VI)	6. MS and post-digestion spikes (Forms V and V-Z)
7. Continuing calibrations with retention time information (Form VII)	7. Sample duplicates (Form VI)
8. Quantitation limit standard (Form VII-Z)	8. LCSs (Form VII)
9. Internal standard areas and retention times (Form VIII)	9. Method of standard additions (Form VIII)
10. Analytical sequence (Forms VIII-D and VIII-Z)	10. ICP serial dilution (Form IX)
11. Gel permeation chromatography (GPC) calibration (Form IX)	11. Instrument detection limit (IDL) (Form X)
12. Single component analyte identification (Form X)	12. ICP inter-element correction factors (Form XI)
13. Multicomponent analyte identification (Form X-Z)	13. ICP linear working range (Form XII)

Requirements for Data Packages – Organic Analysis	Requirements for Data Packages – Inorganic Analysis
14. Matrix-specific method detection limit (MDL) (Form XI-Z)	
Full (Level IV): **Sections I, II, and III Same as Summary Package**	**Full (Level IV):** **Sections I, II, III Same as Summary Package**
Section IV Sample Raw Data – indicated form, plus all raw data	**Section IV Instrument Raw Data - Sequential measurement readout records for ICP, graphite furnace atomic absorption (GFAA), flame atomic absorption (AA), cold vapor mercury, cyanide, and other inorganic analyses, which will contain the following information:**
1. Analytical results, including dilutions and re-analysis (Forms I and X)	1. Environmental samples, including dilutions and re-analysis
2. Tentatively identified compounds (TICs) (Form I — volatile organic analysis [VOA])	2. Initial calibration
	3. Initial and continuing calibration verifications
Section V QC Raw Data – indicated form, plus all raw data	4. Detection limit standards
1. Method blanks (Form I)	5. Method blanks, continuing calibration blanks, and preparation blanks
2. MS and MSD samples (Form I)	6. ICP interference check samples
3. Blank spikes or LCSs (Form I)	7. MS and post-digestion spikes
	8. Sample duplicates
Section VI Standard Raw Data – indicated form, plus all raw data	9. LCSs
1. Performance check (Form V)	10. Method of standard additions
2. Initial calibrations, with retention-time information (Form VI)	11. ICP serial dilution
3. Continuing calibrations, with retention-time information (Form VII)	**Section V Other Raw Data**
4. Quantitation-limit standard (Form VII-Z)	1. Percent moisture for soil samples
5. GPC calibration (Form IX)	2. Sample digestion, distillation, and preparation logs, as necessary
Section VII Other Raw Data	3. Instrument analysis log for each instrument used
1. Percent moisture for soil samples	4. Standard preparation logs, including initial and final concentrations for each standard used
2. Sample extraction and cleanup logs	5. Formula and a sample calculation for the initial calibration
3. Instrument analysis log for each instrument used (Form VIII-Z)	6. Formula and a sample calculation for soil sample results
4. Standard preparation logs, including initial and final concentrations for each standard used	
5. Formula and a sample calculation for the initial calibration	
6. Formula and a sample calculation for soil sample results	

ANALYTICAL SERVICES TABLE (QAPP WORKSHEET #30)

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Sediment	**DMA-Sed-PRI01-1-ES-SS-1001** **AND** **DMA-Sed-PRI01-2-ES-SS-1002**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2), AND VOCS (SOMO1.2)	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Solid Waste	**DMA-Gyp-PRI04-1-ES-SW-4001** **AND** **DMA-Gyp-PRI04-2-ES-SW-4002**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Soil	**DMA-Soil-PRI05-ES-S-5001**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Sediment	**DMA-Sed-PRI05-2-ES-SS-5002** **AND** **DMA-Sed-PRI05-1-ES-SE-5003**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 day	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Soil	**DMA-Soil-PRI06-ES-S-6001**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Sediment	**DMA-Sed-PRI06-ES-SS-6002**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Sediment	**DMA-Sed-PRI07-1-ES-SE-7001** **AND** **DMA-Sed-PRI07-2-ES-SE-7002**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Solid Waste	**DMA-Smut-PRI09-1-ES-SW-9001** **AND** **DMA-Smut-PRI09-2-ES-SW-9002**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Sediment	**DMA-Sed-PRI14-ES-SS-14001**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Soil	**DMA-Soil-PRI15-ES-S-15001**	PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2),	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Wastewaters	DMA-WW-PRI01-2-ES-WW-17001 AND DMA-WW-PRI05-1-ES-WW-17002 AND DMA-WW-PRI06-ES-WW-17003	Hexavalent Chromium (EPA 7196A), Perchlorate (EPA 6850), TDS (160.1), Alkalinity (EPA 310.1), Anions (EPA 300.0), haloacetic acids (EPA 552.2)	21 days	ALS Laboratory Group 960 West Levoy Drive, Salt Lake City, UT 84123 Kevin Griffiths, 801-266-7700 kevin.griffiths@alsglobal.com	N/A
		PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2), AND VOCS (SOMO1.2)	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA
		Total and Dissolved Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA

Matrix	Sample Locations / ID Number	Analytical Group (Method)	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory
Waters	DMA-W-PRI07-1-ES-W-17004 AND DMA-W-PRI14-ES-W-17005	Hexavalent Chromium (EPA 7196A), Perchlorate (EPA 6850), TDS (160.1), Alkalinity (EPA 310.1), Anions (EPA 300.0), haloacetic acids (EPA 552.2)	21 days	ALS Laboratory Group 960 West Levoy Drive, Salt Lake City, UT 84123 Kevin Griffiths, 801-266-7700 kevin.griffiths@alsglobal.com	N/A
		PCBs (EPA CLP SOW CBC01.2), PCDDs/PCDFs (EPA CLP SOW DLM02.2),	21 days	SGS North America Inc. 5500 Business Drive Wilmington, NC 28405 Contact: Amy Boehm (317) 370-9644 amy.boehm@sgs.com	NA
		SVOCs (EPA CLP SOW SOM01.2, Modified), PAHs-SIM (EPA CLP SOW SOM01.2), AND VOCS (SOMO1.2)	21 days	KAP Technologies Inc - KAP 9391 Grogans Mill Rd, Suite-A2 The Woodlands, TX 77380 Phone Number: 281-367-0065 Laboratory Contact: Rao Alsakani 281-367-0065 ralsakani@sbcglobal.net Sample Custodian: Vishnu Davlapur 281-367-0065 kaptechnologies@gmail.com	NA
		Total and Dissolved Metals (CLP SOW ISM01.3)	21 days	Chemtech Consulting Group - CHEM 284 Sheffield Street Mountainside, NJ 07092 Laboratory Contact: Divya Mehta 908-789-8900 (ext 3150) epa@chemtech.net Sample Custodian: Snehal Mehta 908-789-8900 (ext 3158) epa@chemtech.net	NA

PLANNED PROJECT ASSESSMENTS TABLE (QAPP WORKSHEET #31)

The roles and responsibilities at the Site during the implementation of the Phase 1A DMA are described below.

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Action	Person(s) Responsible for Monitoring Effectiveness of Corrective Action
Field Readiness Review	Before mobilization of major phases of work	Internal / External	EPA	Contractor Project Manager	Contractor Project Manager/Field Team Leader	Contractor Project Manager/Field Team Leader	Contractor Project Manager / QA Manager
Field Sampling Surveillance	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Surveillance	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTES:

EPA US Environmental Protection Agency
QA Quality Assurance

ASSESSMENT FINDINGS AND CORRECTIVE ACTION RESPONSES (QAPP WORKSHEET #32)

Corrective actions will be managed in a manner similar to that shown below.

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings	Timeframe of Notification	Nature of Corrective Action (CA) Response Documentation	Individual(s) Receiving CA Response	Timeframe for Response
Field Readiness Review	Verbal/Email documentation	EPA RPM, Contractor Project Manager, Project QA Manager, Field Team Lead, Geochemisit	2 days	Record of conversation/Email documentation	EPA RPM, Contractor Project Manager, Project QA Manager, Field Team Lead, and Geochemist	2 days
Field Sampling Surveillance	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Surveillance	N/A	N/A	N/A	N/A	N/A	N/A

NOTES:

CA	Corrective Action	QA	Quality Assurance
EPA	US Environmental Protection Agency	RPM	Remedial Project Manager

QA MANAGEMENT REPORTS TABLE (QAPP WORKSHEET #33)

QA Management Reports will be provided according to the schedule provided below.

Type of Report	Frequency	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipient(s)
Daily Progress Report	Daily	At the end of each field day	Field Team Lead/ Project Manager	EPA RPM, Project Manager; QA Manager, Field Team Lead, Geochemist
Weekly Status Report	Weekly	At the end of each week	Project Manager	QA Manager, EPA RPM, Field Team Leader, Geochemist
Monthly Status Report	Monthly	At the end of each month	Project Manager	QA Manager, EPA RPM, Field Team Leader, Geochemist

NOTES:

EPA US Environmental Protection Agency
QA Quality Assurance
RPM Remedial Project Manager

VERIFICATION (STEP I) PROCESS TABLE (QAPP WORKSHEET #34)

Describe in a format similar to that provided below how data quality will be verified to be legally and technically defensible.

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
AUDIT REPORTS	When the report is complete, a copy of all audit reports will be placed in the project file. If corrective actions are required, a copy of the documented corrective action taken will be attached to the appropriate audit report in the project file. At the beginning of each week and at the completion of the Site work, project file audit reports will be reviewed internally to ensure that all appropriate corrective actions have been taken and that corrective action reports are attached. If corrective actions have not been taken, the project manager will be notified to ensure action is taken.	I	Project Manager
FIELD NOTES/LOGBOOK	Field notes will be reviewed internally and placed in the project file. A copy of the field notes will be attached to the final report.	I	Field team lead
CHAIN OF CUSTODY RECORDS	Chain-of-custody forms will be reviewed internally when they are completed and verified against the packed sample coolers they represent. The shipper's signature on the chain-of-custody form should be initialed by the reviewer, a copy of the chain-of-custody form will be retained in the project file, and the original and remaining copies will be taped inside the cooler for shipment.	I	Field team lead/Geochemist
Sample receipt	For samples shipped via commercial carrier, the field team lead will verify receipt of samples by the laboratory the day following shipment.	I	Field team lead
Sample logins	Sample login information will be reviewed and verified for completeness in accordance with the chain-of-custody forms.	I, E	Sample coordinator/Laboratory Project Manager Field team lead
Laboratory data prior to release	Laboratory data will be reviewed and verified for completeness against analyses requested on the chain-of-custody forms.	E	Laboratory Project Manager
Laboratory data due at turnaround time listed on chain of custody	Laboratory data will be verified that the analyses reported are consistent with the analytical suite requested on the chain-of-custody forms.	I	Field Team Leader/Geochemist
LABORATORY DATA packages	All laboratory data packages will be verified for completeness and technical accuracy by the laboratory performing the work. Data packages will then be reviewed by the geochemist for completeness.	I, E	Laboratory Project Manager Geochemist

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Validation	All received data packages will be verified and validated according to the data validation procedures specified in Worksheet #36.	I	Laboratory Project Manager Data Validator
Field and electronic data	One hundred percent of manual entries will be reviewed against the hardcopy information, and 10 percent of electronic uploads will be checked against the hardcopy.	I	Analytical coordinator-Geochemist

VALIDATION (STEPS IIA AND IIB) PROCESS TABLE (QAPP WORKSHEET #35)

Validation of daily operations will be performed in the manner shown below.

Step IIa / IIb[1]	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Field logbook	Field logbooks will be reviewed weekly for accuracy associated with each sampling event. The inspection will be documented in daily QC reports.	Project Manager
IIa	Chain of custody forms	Chain-of-custody forms will be reviewed daily to ensure that project information, sample analyses requested, number of field QC samples collected, and percent level III or IV validation chosen is accurate and in accordance with the requirements in this QAPP.	Analytical Coordinator-Geochemist
IIa	Sample receipt	The sample cooler will be checked for compliance with temperature and packaging requirements.	Laboratory sample custodian
IIa	Sample logins	Sample login will be reviewed for accuracy against the chain-of-custody form.	Field Team Leader Laboratory Project Manager
IIa	Laboratory data prior to release	Laboratory data will be reviewed to ensure that the data are accurate and meets the requirements in this QAPP. Before they are released, data will be validated as follows:	Laboratory Project Manager
		100 percent of the data comply with the method- and project-specific requirements; any deviations or failure to meet criteria are documented for the project file.	Laboratory Analyst
		100 percent of manual entries are free of transcription errors and manual calculations are accurate; computer calculations are spot-checked to verify program validity; data reported are compliant with method- and project-specific QC requirements; raw data and supporting materials are complete; spectral assignments are confirmed; descriptions of deviations from method or project requirements are documented; significant figures and rounding have been appropriately used; reported values include dilution factors; and results are reasonable.	Laboratory Peer Analyst
		Data reported comply with method- and project-specific QC requirements; the reported information is complete; the information in the report narrative is complete and accurate; and results are reasonable.	Laboratory Supervisor
		Data reported comply with method- and project-specific QC; analytical methods are performed in compliance with approved SOPs. This review may be conducted after release of data since they involve only on 10 percent of the data.	Laboratory Quality Assurance Manager
IIa	Laboratory data due at turnaround time listed on chain of custody	Laboratory data will be reviewed to ensure that the data reported met the analyte list and limits listed in Worksheet #15.	Field Team Lead/ Geochemist - Analytical Coordinator
	Laboratory data packages	All laboratory data packages will be validated by the laboratory performing the work for technical accuracy before they are submitted.	Laboratory Project Manager

Step IIa / IIb[1]	Validation Input	Description	Responsible for Validation (name, organization)
		Data packages will then be reviewed for accuracy against the laboratory data that were faxed or e-mailed at the turnaround time listed on the chain of custody.	Geochemist - Analytical Coordinator
		Data packages will be validated.	Validation
IIb	Data validation reports	Data validation reports will be reviewed in conjunction with the project DQOs and data quality indicators.	Geochemist -Analytical Coordinator/ Project Manager

Notes:
[1] IIa=Compliance with methods, procedures, and contracts [see Table 10, page 117, UFP-QAPP manual, V.1, March 2005.].
IIb=Comparison with measurement performance criteria in the QAPP [see Table 11, page 118, UFP-QAPP manual, V.1, March 2005].

ANALYTICAL DATA VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE (QAPP WORKSHEET #36)

Provide the following information in the format shown below.

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
Laboratory Validation				
IIa	Soil/Water	PCBs	In accordance with this QAPP and CLP SOW CBC01.2	Laboratory QA Manager
IIa	Soil/Water	PCDDs/PCDFs	In accordance with the QAPP and CLP SOW DLM02.2	Laboratory QA Manager
IIa	Soil/Water	SVOCs	In accordance with this QAPP and CLP SOW SOM01.2	Laboratory QA Manager
IIa	Soil/Water	VOCs	In accordance with this QAPP and CLP SOW SOM01.2	Laboratory QA Manager
IIa	Soil/Water	Metals	In accordance with this QAPP and CLP SOW ISM02.X (DRAFT)/ISM01.3	Laboratory QA Manager
IIa	Water	Haloacetic Acids	In accordance with this QAPP and EPA Method 552.2 (SOP ### Reqested)	Laboratory QA Manager
IIa	Water	Perchlorate	In accordance with this QAPP and EPA Method 6850 (SOP LC/MS-CLO4)	Laboratory QA Manager
IIa	Water	Anions	In accordance with this QAPP and EPA Method 300.0 (SOP IC-EP-300.0)	Laboratory QA Manager
IIa	Water	Alkalinity	In accordance with this QAPP and EPA Method 310.0 (SOP IC-EP-310.1)	Laboratory QA Manager
IIa	Water	TDS	In accordance with this QAPP and EPA Method 160.1 (SOP IW-EP-160.1)	Laboratory QA Manager
IIa	Water	Hexavalent Chromium	In accordance with this QAPP and EPA Method 7196A (SOP SC-SW-7196)	Laboratory QA Manager
External Data Validation				
IIb	Soil/Water	PCBs	In accordance with this QAPP and CLP SOW CBC01.2, and EPA National Functional Guidelines (2008)	Data Validation Contractor Project Manager
IIb	Soil/Water	PCDDs/PCDFs	In accordance with the QAPP and CLP SOW DLM02.2, and EPA National Functional Guidelines (2005a)	Data Validation Contractor Project Manager
IIb	Soil/Water	SVOCs	In accordance with this QAPP and CLP SOW SOM01.2, , and EPA National Functional Guidelines (2008)	Data Validation Contractor Project Manager
IIb	Soil/Water	VOCs	In accordance with this QAPP and CLP SOW SOM01.2, , and EPA National Functional Guidelines (2008)	Data Validation Contractor Project Manager
IIb	Soil/Water	Metals	In accordance with this QAPP and CLP SOW ISM02.X (DRAFT)/ISM01.3, and EPA National Functional Guidelines (2004a)	Data Validation Contractor Project Manager

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
IIb	Water	Haloacetic Acids	In accordance with this QAPP and EPA Method 552.2 (SOP ###)	Data Validation Contractor Project Manager
IIb	Water	Perchlorate	In accordance with this QAPP and EPA Method 6850 (SOP LC/MS-CLO4)	Data Validation Contractor Project Manager
IIb	Water	Anions	In accordance with this QAPP and EPA Method 300.0 (SOP IC-EP-300.0)	Data Validation Contractor Project Manager
IIb	Water	Alkalinity	In accordance with this QAPP and EPA Method 310.1 (SOP IC-EP-310.1	Data Validation Contractor Project Manager
IIb	Water	TDS	In accordance with this QAPP and EPA Method 160.1 (SOP IW-EP-160.1)	Data Validation Contractor Project Manager
IIb	Water	Hexavalent Chromium	In accordance with this QAPP and EPA Method 7196A (SOP SC-SW-7196)	Data Validation Contractor Project Manager

36.1 DATA VALIDATION AND USABILITY

This section describes the minimum procedures that will be used to review, verify, and validate field and laboratory data. This section also discusses procedures for verifying that the data are adequate to meet project quality objectives (PQOs) and measurement quality objectives (MQOs) for the project.

36.1.1 Data Review, Verification, and Validation

Validation and verification of the data generated during field and laboratory activities are essential to obtaining defensible data of acceptable quality. Verification and validation methods for field and laboratory activities are presented below.

36.1.2 Field Data Verification

Project personnel will verify field data through reviews of data sets to identify inconsistencies or anomalous values. Any inconsistencies discovered will be resolved as soon as possible by seeking clarification from field personnel responsible for data collection. All field personnel will be responsible for following the sampling and documentation procedures described in this QAPP so that defensible and justifiable data are obtained.

Data values that are significantly different from the population are called “outliers.” A systematic effort will be made to identify any outliers or errors before field personnel report the data. Outliers can result from improper sampling or measurement methodology, data transcription errors, calculation errors, or natural causes. Outliers that result from errors found

during data verification will be identified and corrected; outliers that cannot be attributed to errors in sampling, measurement, transcription, or calculation will be clearly identified in project reports.

36.1.3 Laboratory Data Verification

Laboratory personnel will verify analytical data at the time of analysis and reporting and through subsequent reviews of the raw data for any nonconformances to the requirements of the analytical method. Laboratory personnel will make a systematic effort to identify any outliers or errors before they report the data. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in analysis, transcription, or calculation will be clearly identified in the case narrative section of the analytical data package.

36.1.4 Laboratory Data Validation

EPA's contractor will validate all laboratory data in accordance with current EPA national functional guidelines (EPA 1999, 2004a, 2005b, 2008). Ninety percent of the data for COPCs will undergo cursory validation and 10 percent of the data for COPCs will undergo full validation for this project. Requirements for cursory and full validation are listed below.

36.1.4.1 Cursory Data Validation

Cursory validation (Level 3) will be completed on 90 percent of the summary data packages for analysis of COPCs. (The remaining 10 percent of the packages will be subjected to full validation.) The data reviewer is required to notify EPA and request any missing information needed from the laboratory. Elimination of the data from the review process is not allowed. All data will be qualified as necessary in accordance with established criteria. Data summary packages will consist of sample results and QC summaries, including calibration and internal standard data.

36.1.4.2 Full Data Validation

Full validation (Level 4) will be completed on 10 percent of the full data packages for analysis of COPCs. The data reviewer is required to notify EPA and request any missing information needed from the laboratory. Elimination of data from the review process is not allowed. All data will continue through the validation process and will be qualified in accordance with established criteria. Data summary packages will consist of sample results, QC summaries, and all raw data associated with the sample results and QC summaries.

36.1.4.3 Data Validation Criteria

Worksheets #12, #24, #25, #28, and #36, along with the analytical methods and laboratory SOPs, list the QC checks and criteria that will be reviewed for both cursory and full data validation. The data validation criteria selected from the following table will be consistent with the project-specific analytical methods referenced in Worksheet #19.

USABILITY ASSESSMENT (QAPP WORKSHEET #37)

Refer to the Final DMA Work Plan (EPA 2012) for the useability assessment of the ERM collected data. For this DMA Oversight QAPP, the following elements will be considered in the useability assessment of the split-sampling data.

37.1 MEASUREMENT QUALITY OBJECTIVES

All analytical results will be evaluated in accordance with PARCC parameters to document the quality of the data and to ensure that the data are of sufficient quality to meet the project objectives. Of these PARCC parameters, precision and accuracy will be evaluated quantitatively by collecting the QC samples listed in Worksheet #12.

The following subsections describe each of the PARCC parameters and how they will be assessed within this project.

37.1.1 Precision

Precision is the degree of mutual agreement between individual measurements of the same property under similar conditions. Usually, combined field and laboratory precision are evaluated by collecting and analyzing field duplicates and then calculating the variance between the samples, typically as a relative percent difference (RPD):

$$RPD = \frac{|A-B|}{(A+B)/2} \quad x \quad 100\%$$

where:

A	=	First duplicate concentration
B	=	Second duplicate concentration

Field sampling precision is evaluated by analyzing field duplicate samples. Laboratory analytical precision is evaluated by comparing analytical results of field samples with those of field duplicates, laboratory matrix duplicates, or by analyzing MS of field samples along with MSD. For this project, MS/MSD samples will be generated for all organic analytes. MS/MSDs or matrix duplicates will be used to assess precision for inorganic analytes. The results of the analysis of each MS/MSD or duplicate pair will be used to calculate an RPD for evaluating precision. Worksheet #28 presents the precision goals for this project.

37.1.2 Accuracy

Field accuracy will be assessed by collecting and analyzing equipment rinsate and source water blank QC samples. These QC samples will be used to evaluate the potential for target analytes to enter samples as a result of sampling processes.

A program of sample spiking will be conducted to evaluate laboratory accuracy. This program includes analysis of the MS and MSD samples, LCS or blank spikes, surrogate standards, and

method blanks. MS samples will be prepared and analyzed at a frequency of 5 percent for samples that will require analysis for inorganic chemicals. LCS or blank spikes are also analyzed at a frequency of 5 percent or per extraction batch, whichever is most frequent. Surrogate standards, where available, are added to every sample analyzed for organic constituents. The results of the spiked samples are used to calculate the percent recovery (%R) for evaluating accuracy.

$$Percent\ \text{Recovery} = \frac{S - C}{T} \quad x \quad 100$$

where:

S = Measured concentration in the spiked water or soil sample

C = Unspiked water or soil sample concentration

T = True or actual concentration of the spike

A similar calculation may be expressed for air as:

$$Percent\ \text{Recovery} = \frac{S - M}{T} \quad x \quad 100$$

where:

S = Measured mass in sample

M = Unspiked air sample mass

T = True or actual mass of the spike

Worksheet #28 presents accuracy goals for this investigation based on the %R of laboratory, matrix, and surrogate spikes. Results that fall outside the accuracy goals will be evaluated further on the basis of the results of other QC samples.

37.1.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental condition that they are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters. Representative data will also be obtained through proper collection and handling of samples to avoid interference and minimize contamination.

Representativeness of data will also be ensured through consistent application of established field and laboratory procedures. Laboratory blank samples will be evaluated for the presence of contaminants to aid in evaluating the representativeness of sample results. Data determined to be nonrepresentative, by comparison with existing data, will be used only if accompanied by appropriate qualifiers and limits of uncertainty.

37.1.4 Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this QAPP, and when none of the QC criteria that affect data usability are exceeded. When all data validation is completed, the percent completeness value will be calculated by dividing the number of useable sample results by the total number of sample results planned for this investigation.

As discussed further in Section 37.2, completeness will also be evaluated as part of the data quality assessment (DQA) process (EPA 2006a). This evaluation will help determine whether any limitations are associated with the decisions to be made based on the data collected.

37.1.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data. Field procedures will be standardized to ensure comparability. The comparability of laboratory data will be assured by use of established and approved analytical methods, consistency in the basis of analysis (wet weight, volume, or similar units), and consistency in reporting units (parts per million, parts per billion, and so forth).

37.1.6 Detection and Quantitation Limits

The MDL and IDL are the minimum concentrations of an analyte that can be reliably distinguished from background noise for a specific analytical method. The quantitation limit represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a specific sample matrix. Project-required reporting limits (PRRLs) are contractually required quantitation limits (CRQLs) for specific analytical methods and sample matrices, such as soil or water, and are typically several times higher than the MDL to allow for matrix effects. PRRLs/CRQLs, which are established by EPA in the scope of work for subcontract laboratories, are set to establish minimum criteria for laboratory performance; actual laboratory quantitation limits may be substantially lower.

Analytical methods have been selected for this project so that the CRQL for each target analyte is below the applicable comparison criteria wherever practical. Worksheet #15 in the Final DMA Work Plan (EPA 2012) compares the target quantitiation limits (TQLs) for the selected analytical methods with comparison criteria. This comparison shows that the analytical methods selected and the associated CRQLs and MRLs are capable of quantifying the CPOCs at concentrations below the applicable screening criteria, in most cases. The listed methods will be used unless reasonable grounds are established for pursuing non-routine methods. All analytes will be reported as estimated values if concentrations are less than CRQLs/MRLs but greater than MDLs or IDLs, as appropriate. This procedure is being adopted to help ensure that analytical results can effectively be compared with comparison criteria for certain compounds where the screening criteria are near or below the CRQLs/MRLs. This procedure also will help to ensure that subsequent statistical evaluations of the data will not be biased by high-value nondetect results.

37.2 RECONCILIATION WITH USER REQUIREMENTS

After environmental data have been reviewed, verified, and validated in accordance with the procedures, the data must be further evaluated to determine whether DQOs have been met. To

the extent possible, EPA will follow the DQA process to verify that the type, quality, and quantity of data collected are appropriate for their intended use. DQA methods and procedures are outlined in EPA's "Guidance for Data Quality Assessment, Practical Methods for Data Analysis" (EPA 2006a). The DQA process includes five steps: (1) review the PQOs and sampling design; (2) conduct a preliminary data review; (3) select a statistical test; (4) verify the assumptions of the statistical test; and (5) draw conclusions from the data.

The EPA project team will systematically assess data quality and data usability when the five-step DQA process is not completely followed because the PQOs are qualitative. This assessment will include the following:

- A review of the sampling design and sampling methods to verify that these were implemented as planned and are adequate to support project objectives
- A review of project-specific data quality indicators for PARCC and quantitation limits to evaluate whether acceptance criteria have been met
- A review of project-specific PQOs to determine whether they have been achieved by the data collected
- An evaluation of any limitations associated with the decisions to be made based on the data collected.

The final report for the project will discuss any potential impacts of these reviews on data usability and will clearly define any limitations associated with the data.

REFERENCES

Environmental Resource Management (ERM). 2012. *Site Specific Health and Safety Plan, Phase 1A Investigation.* US Magnesium RI/FS. September.

US Environmental Protection Agency (EPA) 2001. EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5. Office of Environmental Information. Washington, DC. EPA/240/B-01/003. March.

EPA 2005. Uniform Federal Policy for Implementing Environmental Quality Systems. Evaluating, Assessing, and Documenting Environmental Data Collection/Use and Technology Programs. Intergovernmental Data Quality Task Force. EPA-505-F-03-001. March.

EPA 2007. Guidance for Preparing Standard Operating Procedures QA/G-6 Office of Environmental Information. Washington, D.C. EPA/600/B-07/001, April.

EPA 2011. Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study, US Magnesium Site, U.S. EPA Region 8, CERCLA Docket No. CERCLA-08-2011-0013. August 4.

EPA 2012. Final Demonstration of Method Applicability Work Plan for Soil, Sediment, Waste, and Water, Preparatory to Phase-1A Remedial Investigation, US Magnesium NPL Site, September.

Pacific Western Technologies, Ltd. (PWT) 2012. Oversight Site-Specific Health and Safety Plan, US Magnesium NPL Site. September.

ATTACHMENTS

ATTACHMENT 14A: OVERSIGHT DATA MANAGEMENT PLAN

SPLIT-SAMPLING AND OVERSIGHT
QUALITY ASSURANCE PROJECT PLAN
DEMONSTRATION OF METHOD APPLICABILITY

US MAGNESIUM NPL SITE
EPA SITE IDENTIFICATION NO. UTN000802704
TOOELE COUNTY, UTAH

September 2012

REVISION 0

Prepared by:

Pacific Western Technologies, Ltd.
11049 W. 44th Avenue
Wheat Ridge, CO 80033

TABLE OF CONTENTS

TABLE OF ACRONYMS

CAS	Chemical abstracts service
CLP	Contract Laboratory Program
DMP	Date Management Plan
EPA	Environmental Protection Agency
ESRI	Environmental Systems Research Institute
GIS	Geographic information system
NAS	Network attached storage
ODBC	Open database connectivity
PWT	Pacific Western Technologies, Ltd.
QA	Quality assurance
QC	Quality control

1.0 INTRODUCTION

A variety of oversight data may be collected at the US Magnesium Site (Site) through a variety of techniques including, but not limited to: field observations, measurements and sampling, air monitoring, and laboratory analyses. This wide range of work will generate data that will need to be managed properly. This current Oversight Data Management Plan (DMP) was developed to provide a general description of the data management practices and procedures to be implemented only during oversight of the DMA soil/sediment/solid waste and water sampling activities. The EPA oversight of the DMA will consist of collecting data to evaluate the reproducibility of ERM-collected data.

The objectives of this data management plan are to:

1. Outline database management goals and required functionality.
2. Describe the data management system and procedures.
3. Describe quality assurance/quality control methodologies and practices to ensure data integrity.

This Oversight DMP documents the various methods of collection, storage, and use of data that may be collected during the EPA oversight of the DMA and the transmittal of data between the EPA and oversight contractors. The DMP also specifies how information will be managed, stored, transmitted, and documented to maintain the required level of information quality specified for the project.

2.0 DATA MANAGEMENT TEAM

Overall project organization and responsibilities for PWT have been previously defined in the Oversight QAPP. All project staff will have some level of responsibility in implementing this Oversight DMP. The following are the key PWT and EPA personnel responsible for implementing the Oversight DMP.

Ken Wangerud, EPA RPM, is responsible for overall implementation of the project to ensure that data quality objectives are met.

Jeff Mosal, EPA Region 8 Data Lead for the US Magnesium Project, is responsible for implementing EPA data management for the project and will act as the primary contact for data management issues.

Joe Schafer, EPA Environmental Response Team Scribe Lead, will assist EPA Region 8 with Scribe and Scribe.net implementations for the administrative record.

Levi Todd, PWT Project Manager, is responsible for:

- overall implementation of the project for PWT, management of field and project personnel, and serves as liaison to the EPA, team members, and all subcontractors.
- oversight of the data management program.

Amanda Semenenko, PWT Database Manager, has primary responsibility for:

- management of the EPA split-sampling Scribe database
- coordination with PWT, TTEMI, EPA, and ERM database participants
- obtaining and integrating ERM-collected data published by ERM to Scribe.net for use in the split-sampling program
- publishing EPA-generated data contained in EPA's Scribe database to Scribe.net.

Aaron Baird, Field Team Lead, is responsible for coordinating sample collection and analyses, and for importing data into Scribe. The Field Team Lead will:

- provide notification to laboratory of upcoming sampling activity and arranges for a sufficient supply of sample containers and sample coolers
- generate sample labels and initiates trip report / chain of custody form
- prepare, reviews and initials the sampling forms to insure that all samples were collected appropriately
- compile field forms, field notes, chain of custody forms and other field documentation and updates the project files to provide a traceable record for data collection activities
- save EDDs into appropriate locations on PWT server and ensure verification of the accuracy of EDD import to Scribe or other electronic databases
- load CLP and commercial lab data into Scribe.

Robert Howe, Tetra Tech Project Manager and Geochemist, is responsible for

- inspecting laboratory data deliverables (EDDs and data packages) for completeness
- ensuring proper data verification/validation by PWT and/or TTEMI validators
- participating in the data assessment activities.

3.0 DATABASE MANAGEMENT GOALS

The EPA split-sampling and oversight program database structures and database administration procedures presented in this document are designed to accommodate the following goals, concepts, and functional requirements:

- Store attribute data, such as analytical results and sample collection information in Scribe
- Implement quality control procedures and applicable review rules. Additionally, database macros, validation rules, and entry procedures to promote data integrity and completeness will be used.

- Automate data management and quality control procedures to the greatest extent possible without sacrificing the quality of data. Develop constraints and look-up tables within the databases to ensure appropriate and consistent entries where possible. Develop database structures and constraints to promote data integrity and completeness.
- Implement database security measures to maintain data integrity. This will include limiting read / write access and ensuring the stability of source data when used in conjunction with other means of accessing the data.

4.0 DATA TYPES AND STORAGE

4.1 DATA TYPES

The following are anticipated types of data that will be managed according to specific workflows in order to assure ensure data quality and accuracy are preserved.

- Laboratory analytical data (e.g., soil, sediment, water, air),
- Field-generated parameters (health and safety monitoring results),
- Sample identification and sample characteristics (sample identification and corresponding identification of ERM's sample pair will be recorded on split-sampling forms (see Attachment 1)),
- Sample collection field observations,
- Sample processing field observations.
- Photographic documentation

Information pertaining to the creation and verification of these data (i.e., metadata) will also be stored in Scribe, to the extent applicable.

EPA does not anticipate collecting spatial data during the DMA because ERM is responsible for collecting and managing that data, and providing it to EPA.

Electronic and hard-copy data will be generated during split sampling activities. Anticipated electronic data includes laboratory electronic data deliverables (EDDs) in Scribe format (see Attachment 2), and electronic data packages from EPA CLP and commercial laboratories.

Anticipated hard-copy data includes field notes and logbooks, field sampling forms, chain of custody forms, phone logs, hard-copy laboratory reports, and verification/validations worksheets. Some or all of this hard copy data may be scanned to form electronic pdfs. Copies of hard copy field sheets will be provided to EPA on a weekly basis.

Additional documents may be created through the analysis of existing data that may be exported directly from the creation software into a PDF. As applicable, PDF documents will be uploaded to EPA's document management system to ensure the EPA and other project participants have access to these data.

4.2 DATA STORAGE/SCRIBE DATABASE

EPA's Scribe database will be used as the primary management and storage tool for EPA oversight field and laboratory data collected during the DMA. Scribe is an Access database designed to store chemical data. The system has the flexibility to store some continuously collected data and lithologic data. Scribe.net is a management and publishing system that allows for tracking changes to project databases and for distributing the data to interested parties. A description of the data types managed within Scribe is provided in Attachment XXX.

If needed, GIS software manufactured by Environmental Systems Research Institute (ESRI), will be the primary GIS software used for GIS coverages. Open database connectivity (ODBC) drivers enable ArcGIS to link directly to attribute data stored in MS Access (and Scribe). Other software that will be used for certain data maintenance, conversion, and spatial analysis functions may include ESRI's Arc/Info and 3-D Analyst, and AutoCAD, manufactured by Autodesk.

ERM-collected and generated data will be electronically transferred by ERM from EQuIS into a Scribe database and published via Scribe.net. Data will be retained in a formal Scribe database for use by EPA. EPA anticipates using ERM's laboratory and spatial data in Scribe for use in the evaluation of the reproducibility of the data and for preparation of reports.

The spatial data collected by ERM and used by EPA will comply with the EPA Region 8 GIS requirements (see Attachment 3).

A document repository, Superfund Document Management System (SDMS) system maintained by the EPA will also be used to store and facility transmission of PDFs and other documents.

5.0 DATA MANAGEMENT PROCESS

The following subsections document the general data management process for the anticipated types of oversight and split-sampling data generated by EPA during the DMA.

5.1 FIELD DATA MANAGEMENT

Sample locations for the DMA have been identified in the Final DMA Work Plan (EPA 2012a). These locations will be field confirmed by ERM prior to the sampling event, and re-confirmed by EPA prior to sampling. Sample location data will be collected and managed by ERM. EPA split sample information - including type, analytical methods, analytes, bottles, and laboratories – are identified in EPA's Oversight QAPP (EPA 2012b).

As indicated in Section 4.1, EPA will observe and record relevant field sample collection and processing data. ERM has primary responsibility for sample collection and sample processing observation data (see EPA 2012a), and EPA's responsibility is limited to oversight and acceptance of split samples. EPA will record split-sample identification numbers on split-sampling forms included as Attachment 1.

Relevant field data will be imported into Scribe and 100 percent verified for accuracy and completeness against original field notes. Data that was not obtained in an electronic format, such as information from field sampling forms and chain of custody forms, may be entered into the database through data entry forms. The data entry forms will be designed to expedite correct data entry by the administrator. Pick lists and default values will be built into the data entry forms to facilitate entry and promote data integrity.

5.2 LABORATORY DATA MANAGEMENT

Split-sampling laboratory-generated analytical data will be created for all major media types at the site, including soil, sediment, surface water, groundwater, and air. All laboratories have been provided with the specifications of the EDD format required for direct loading into Scribe. A copy of the format and its specifications is included in Attachment 2. Management of laboratory data will follow the steps described below:

- CLP oversight laboratories will report analytical data in EDDs provided in Scribe format. The samples analyzed by the EPA CLP (Contract Laboratory Program Support System) will load the EDD for the sample to the SMO (Sample Management Office) Portal. The PWT3 Team will retrieve the EDD from the SMO Portal and load the data into Scribe.
- Commercial laboratories have been instructed to provide EDDs in Scribe format as well. These EDDs will be imported into Scribe; however, some manual manipulation of these EDDs may be required for Scribe compatibility.
- The Field Team Lead will load relevant sample collection data into Scribe.
- Once the data have been uploaded into Scribe, the database manager and data management staff, will oversee QA/QC verification of all the draft electronic data by pulling the information from the database and comparing it against field notes and laboratory data package reports to verify accuracy of EDDs. Verification will be conducted on 100% of the data. This will ensure that all data being reported electronically accurately reflect data reported in other forms.
- The data management staff will check the laboratory data for accuracy of the result value, significant figures, analytical methods, analytes, laboratory qualifiers, detection limits, and completeness verses the chain-of-custody. EPA's contractor will internally track the review and verification process, along with any issues identified. Any issues identified that require correction will be communicated to the Project Manager. Any corrections or modifications to the data will be officially recorded in the various comments or notes fields in the applicable tables.
- Laboratory data will be validated per the details specified in the individual SAPs and the project-specific QAPP, under the direction of the QA/QC Manager.
- Once data from the entire SAP sampling episode have been validated, the Data Manager will upload and publish these data to a Scribe database via Scribe.net.
- Post-validation data modifications will be incorporated using standard validator qualifiers, changes in status based on qualification, and updated approval codes.

It is understood that ERM will provide analytical data to EPA in a Scribe database in which ERM's analytical data have been verified and validated, and all required relational information is included. In addition, EPA may request individual EDDs from ERM's analytical laboratory as

needed. EPA will compare the ERM data to the split sampling data to evaluate the reproducibility of ERM's program.

5.3 DATA ANALYSIS AND REPORTING

Standard reporting formats in Scribe, or custom report formats, may be used to create tables, shape files, or data files for visualization, document production, or further data analysis. Standardized reports may also be developed to mimic data entry forms that can then be used for QA checking of the data entry process. Data retrieval reports will be developed to provide data displays in formats as requested by project managers and technical staff.

Spatial data is expected to be generated by ERM for the US Magnesium project during the DMA. EPA will use the ERM-collected spatial data through the ERM-provided Scribe database, as discussed elsewhere in this Data Management Plan and in ERM's Data Management Plan (EPA 2012a).

5.4 DATA EXCHANGE

All project staff, the EPA, and EPA's oversight contractors, and ERM will have access to the database once it is published via Scibe.net.

6.0 SYSTEM MANAGEMENT AND ADMINISTRATION

This section describes the database administration, general database configuration, and quality assurance/quality control procedures that will be used for data related to soil/sediment/solid waste and water split sampling.

6.1 DATABASE ADMINISTRATION

The split sample database will have a single database manager who is responsible for the following:

- Determining the scope of data and acceptable data sources
- Designing or modifying electronic database structures to accommodate new data and data users
- Determining or modifying database entry procedure
- Determining and implementing quality control / quality assurance procedures
- Providing mechanisms for timely data retrieval
- Establishing security measures that allow only authorized personnel to add, modify, or delete data
- Establishing procedures for maintaining adequate database performance during data entry and retrieval (for instance, defragmenting the database, building "queries" or "views" that link two or more tables, creating data reporting templates, and upgrading software and hardware as needed)

Typically, the database manager will conduct the following activities: design the database and incorporate data integrity constraints on specific fields; develop electronic data entry forms;

create automated data conversion routines; develop and automate any data processing steps; create data retrieval tools such as standardized reports; and ensure periodic database backups.

6.2 QUALITY ASSURANCE AND QUALITY CONTROL

PWT's corporate quality assurance and quality control procedures will be followed. The goal is to provide a methodology map to facilitate PWT's ability to provide products and services that meet or exceed applicable requirements. QA/QC procedures shall be implemented to effectively administer and control data integrity. Where necessary, QA/QC procedures may be updated and revised to improve data quality.

The primary data that will be generated are analytical results from split samples sent to the CLP and commercial laboratories. The EPA-contracted laboratories will be responsible for laboratory data entry and performing error checking routines (both record and batch group checking) prior to reporting results. The laboratory is responsible for analysis and internal QA/QC procedures.

Specific QA/QC checks on the data in the database have been described as part of the process in Sections 5.1 and 5.2.

6.3 DATABASE SECURITY AND BACKUPS

Database security will be implemented and maintained throughout the project duration. Read/write access to each database is restricted to the database manager and any other staff designated by the database manager. All project staff have read-only access to the databases, so that the databases can be accessed, but cannot be changed. If changes to the database structure affecting information content is required, the database manager must notify and involve the various project investigators and data users to verify that important information is not inadvertently removed or made inaccessible.

The site-specific Scribe database will be maintained on the PWT local area network (LAN) and stored separately on a database-specific network share. PWT creates and controls user level access to defined network shares. These shares are setup operationally on a network attached storage (NAS) device which is physically separate from the LAN servers. The NAS device is backed up using weekly full and daily differential schemas. Backups are made to removable tapes and removable USB devices with storage media removed from the office on daily basis.

ATTACHMENT 15A: Reference Limits and Evaluation Table

SAP Worksheet #15 - Reference Limits and Evaluation Table*

Laboratory: CLP
Matrix: Solid
Analytical Group: Metals (CLP SOW ISM01.3)
Concentration Level: Standard

Analyte	CAS Number	Contract Required Quantitation Limits (mg/kg) [1]
Aluminum	7429-90-5	2.00E+01
Antimony	7440-36-0	1.00E+00
Arsenic	7440-38-2	5.00E-01
Barium	7440-39-3	5.00E+00
Beryllium	7440-41-7	5.00E-01
Cadmium	7440-43-9	5.00E-01
Calcium	7440-70-2	5.00E+02
Chromium	7440-47-3	1.00E+00
Cobalt	7440-48-4	1.00E+00
Copper	7440-50-8	5.00E-01
Cyanide	57-12-5	5.00E-01
Iron	7439-89-6	1.00E+01
Lead	7439-92-1	5.00E-01
Magnesium	7439-95-4	5.00E+02
Manganese	7439-96-5	5.00E-01
Mercury	7439-97-6	1.00E-01
Potassium	7440-09-7	5.00E+02
Molybdenum	7439-98-7	5.00E-01
Nickel	7440-02-0	5.00E-01
Selenium	7782-49-2	2.50E+00
Silver	7440-22-4	5.00E-01
Sodium	7440-23-5	5.00E+02
Thallium	7440-28-0	5.00E-01
Vanadium	7440-62-2	2.50E+00
Zinc	7440-66-6	1.00E+00

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

mg/kg - milligrams per kilogram

NSV - No Screening Value Available

NA - Not Available

1 CLP CRQLs, cations based on ICP-AES, trace metals based on ICP-MS

SAP Worksheet #15 - Reference Limits and Evaluation T

Laboratory:
Matrix: Aqueous
Analytical Group: Metals (CLP SOW ISM01.3)
Concentration Level: Standard

Analyte	CAS Number	Contract Required Quantitation Limits (mg/L) [1]
Aluminum	7429-90-5	2.00E-02
Antimony	7440-36-0	2.00E-03
Arsenic	7440-38-2	1.00E-03
Barium	7440-39-3	1.00E-02
Beryllium	7440-41-7	1.00E-03
Cadmium	7440-43-9	1.00E-03
Calcium	7440-70-2	5.00E-01
Chromium	7440-47-3	2.00E-03
Chromium, Hexavalent	18540-29-9	2.00E-02
Cobalt	7440-48-4	1.00E-03
Copper	7440-50-8	2.00E-03
Cyanide	57-12-5	1.00E-03
Iron	7439-89-6	2.00E-01
Lead	7439-92-1	1.00E-03
Magnesium	7439-95-4	5.00E-01
Manganese	7439-96-5	1.00E-03
Mercury	7439-97-6	2.00E-01
Potassium	7440-09-7	5.00E-01
Molybdenum	7439-98-7	1.00E-03
Nickel	7440-02-0	1.00E-03
Selenium	7782-49-2	5.00E-03
Silver	7440-22-4	1.00E-03
Sodium	7440-23-5	5.00E-01
Thallium	7440-28-0	1.00E-03
Vanadium	7440-62-2	5.00E-03
Zinc	7440-66-6	2.00E-03

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

mg/L - milligrams per liter

NSV - No Screening Value Available

NA - Not Available

1 CLP CRQLs, cations based on ICP-AES, trace metals based on ICP-MS

SAP Worksheet #15 - Reference Limits and Evaluation Tab

Laboratory:
Matrix: Solid
Analytical Group: SVOCs (CLP SOW SMO1.2)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/kg)
2-Methlynaphthalene	91-57-6	3.30E+00
Acenaphthene	83-32-9	3.30E+00
Acenaphthylene	208-96-8	3.30E+00
Anthracene	120-12-7	3.30E+00
Benzo(a)anthracene	56-55-3	3.30E+00
Benzo(a)pyrene	50-32-8	3.30E+00
Benzo(b)fluoranthene	205-99-2	3.30E+00
Benzo(g,h,i)perylene	191-24-2	3.30E+00
Benzo(k)fluoranthene	207-08-9	3.30E+00
Chrysene	218-01-9	3.30E+00
Dibenzo(a,h)anthracene	53-70-3	3.30E+00
Fluoranthene	206-44-0	3.30E+00
Fluorene	86-73-7	3.30E+00
Indeno(1,2,3-cd)pyrene	193-39-5	3.30E+00
Naphthalene	91-20-3	3.30E+00
Phenanthrene	85-01-8	3.30E+00
Pyrene	129-00-0	3.30E+00

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

µg/kg - micrograms per kilogram

NSV - No Screening Value Available

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: SVOCs (CLP SOW SMO1.2)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/L)
2-Methlynaphthalene	91-57-6	1.00E-01
Acenaphthene	83-32-9	1.00E-01
Acenaphthylene	208-96-8	1.00E-01
Anthracene	120-12-7	1.00E-01
Benzo(a)anthracene	56-55-3	1.00E-01
Benzo(a)pyrene	50-32-8	1.00E-01
Benzo(b)fluoranthene	205-99-2	1.00E-01
Benzo(g,h,i)perylene	191-24-2	1.00E-01
Benzo(k)fluoranthene	207-08-9	1.00E-01
Chrysene	218-01-9	1.00E-01
Dibenzo(a,h)anthracene	53-70-3	1.00E-01
Fluoranthene	206-44-0	1.00E-01
Fluorene	86-73-7	1.00E-01
Indeno(1,2,3-cd)pyrene	193-39-5	1.00E-01
Naphthalene	91-20-3	1.00E-01
Phenanthrene	85-01-8	1.00E-01
Pyrene	129-00-0	1.00E-01

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

µg/L - micrograms per liter

NSV - No Screening Value Available

SAP Worksheet #15 - Reference Limits and Evaluation Tabl

Laboratory:
Matrix: Solid
Analytical Group: SVOCs (CLP SOW SMO1.2 Modified)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/kg)
2-Chloronaphthalene	91-58-7	1.70E+02
1,1'-Biphenyl	92-52-4	1.70E+02
1,2,4,5-Tetrachlorobenzene	95-94-3	1.70E+02
2-Chlorophenol	95-57-8	1.70E+02
2-Methylphenol	95-48-7	1.70E+02
2-Nitroaniline	88-74-4	3.30E+02
2-Nitrophenol	88-75-5	1.70E+02
2,2'Oxybis(1-chloropropane); also known as bis(2-chloroisopropyl)ether	108-60-1	1.70E+02
2,4-Dimethylphenol	105-67-9	1.70E+02
2,4-Dinitrophenol	51-28-5	3.30E+02
2,4-Dinitrotoluene	121-14-2	1.70E+02
2,4-Dichlorophenol	120-83-2	1.70E+02
2,6-Dinitrotoluene	606-20-2	1.70E+02
2,4,5-Trichlorophenol	95-95-4	1.70E+02
2,4,6-Trichlorophenol	88-06-2	1.70E+02
3-Nitroaniline	99-09-2	3.30E+02
3,3'-Dichlorobenzidine	91-94-1	1.70E+02
4-Bromophenyl-phenylether	101-55-3	1.70E+02
4-Chloro-3-methylphenol	59-50-7	1.70E+02
4-Chloroaniline	106-47-8	1.70E+02
4-Chlorophenyl-phenylether	7005-72-3	1.70E+02
4-Methylphenol (as 3&4 methyl	106-44-5	1.70E+02
4-Nitroaniline	100-01-6	3.30E+02
4-Nitrophenol	100-02-7	3.30E+02
4,6-Dinitro-2-methylphenol	534-52-1	3.30E+02
Acetophenone	98-86-2	1.70E+02
Atrazine	1912-24-9	1.70E+02
Benzaldehyde	100-52-7	1.70E+02
bis(2-Chloroethoxy) methane	111-91-1	1.70E+02
bis(2-Chloroethyl) ether	111-44-4	1.70E+02
bis(2-Ethylhexyl) phthalate	117-81-7	1.70E+02
Butylbenzylphthalate	85-68-7	1.70E+02
Carbazole	86-74-8	1.70E+02

SAP Worksheet #15 - Reference Limits and Evaluation Tabl

Laboratory:
Matrix: Solid
Analytical Group: SVOCs (CLP SOW SMO1.2 Modified)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/kg)
Dibenzofuran	132-64-9	1.70E+02
Diethylphthalate	84-66-2	1.70E+02
Dimethylphthalate	131-11-3	1.70E+02
Di-n-butylphthalate	84-74-2	1.70E+02
Di-n-octylphthalate	117-84-0	1.70E+02
Hexachlorobenzene	118-74-1	1.70E+02
Hexachlorobutadiene	87-68-3	1.70E+02
Hexachlorocyclopentadiene	77-47-4	1.70E+02
Hexachloroethane	67-72-1	1.70E+02
Isophorone	78-59-1	1.70E+02
N-Nitrosodimethylamine	62-75-9	1.70E+02
N-Nitrosodiphenylamine	86-30-6	1.70E+02
N-Nitroso-di-n-propylamine	621-64-7	1.70E+02
Nitrobenzene	98-95-3	1.70E+02
Pentachlorophenol	87-86-5	3.30E+02
Phenol	108-95-2	1.70E+02
2,3,4,6-Tetrachlorophenol	58-90-2	1.70E+02

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

µg/kg - micrograms per kilogram

NSV - No Screening Value Available

TBD - To Be Determined

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: SVOCs (CLP SOW SMO1.2 Modified)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/L)
2-Chloronaphthalene	91-58-7	5.00E+00
1,1'-Biphenyl	92-52-4	5.00E+00
1,2,4,5-Tetrachlorobenzene	95-94-3	5.00E+00
2-Chlorophenol	95-57-8	5.00E+00
2-Methylphenol	95-48-7	5.00E+00
2-Nitroaniline	88-74-4	1.00E+01
2-Nitrophenol	88-75-5	5.00E+00
2,2'Oxybis(1-chloropropane); also known as bis(2-chloroisopropyl)ether	108-60-1	5.00E+00
2,4-Dimethylphenol	105-67-9	5.00E+00
2,4-Dinitrophenol	51-28-5	1.00E+01
2,4-Dinitrotoluene	121-14-2	5.00E+00
2,4-Dichlorophenol	120-83-2	5.00E+00
2,6-Dinitrotoluene	606-20-2	5.00E+00
2,4,5-Trichlorophenol	95-95-4	5.00E+00
2,4,6-Trichlorophenol	88-06-2	5.00E+00
3-Nitroaniline	99-09-2	1.00E+01
3,3'-Dichlorobenzidine	91-94-1	5.00E+00
4-Bromophenyl-phenylether	101-55-3	5.00E+00
4-Chloro-3-methylphenol	59-50-7	5.00E+00
4-Chloroaniline	106-47-8	5.00E+00
4-Chlorophenyl-phenylether	7005-72-3	5.00E+00
4-Methylphenol	106-44-5	5.00E+00
4-Nitroaniline	100-01-6	1.00E+01
4-Nitrophenol	100-02-7	1.00E+01
4,6-Dinitro-2-methylphenol	534-52-1	1.00E+01
Acetophenone	98-86-2	5.00E+00
Atrazine	1912-24-9	5.00E+00
Benzaldehyde	100-52-7	5.00E+00
bis(2-Chloroethoxy) methane	111-91-1	5.00E+00
bis(2-Chloroethyl) ether	111-44-4	5.00E+00
bis(2-Ethylhexyl) phthalate	117-81-7	5.00E+00
Butylbenzylphthalate	85-68-7	5.00E+00

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: SVOCs (CLP SOW SMO1.2 Modified)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/L)
2-Chloronaphthalene	91-58-7	5.00E+00
Carbazole	86-74-8	5.00E+00
Dibenzofuran	132-64-9	5.00E+00
Diethylphthalate	84-66-2	5.00E+00
Dimethylphthalate	131-11-3	5.00E+00
Di-n-butylphthalate	84-74-2	5.00E+00
Di-n-octylphthalate	117-84-0	5.00E+00
Hexachlorobenzene	118-74-1	5.00E+00
Hexachlorobutadiene	87-68-3	5.00E+00
Hexachlorocyclopentadiene	77-47-4	5.00E+00
Hexachloroethane	67-72-1	5.00E+00
Isophorone	78-59-1	5.00E+00
N-Nitrosodimethylamine	62-75-9	5.00E+00
N-Nitrosodiphenylamine	86-30-6	5.00E+00
N-Nitroso-di-n-propylamine	621-64-7	5.00E+00
Nitrobenzene	98-95-3	5.00E+00
Pentachlorophenol	87-86-5	1.00E+01
Phenol	108-95-2	5.00E+00
2,3,4,6-Tetrachlorophenol	58-90-2	5.00E+00

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

µg/L - micrograms per liter

NSV - No Screening Value Available

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Solid
Analytical Group: PCBs (CLP SOW CBC01.2)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/kg)
Monochlorobiphenyls, Total	27323-18-8	NA
Dichlorobiphenyls, Total	25512-42-9	NA
Trichlorobiphenyls, Total	25323-68-6	NA
Tetrachlorobiphenyls, Total	26914-33-0	NA
Pentachlorobiphenyls, Total	25429-29-2	NA
Hexachlorobiphenyls, Total	26601-64-9	NA
Heptachlorobiphenyls, Total	28655-71-2	NA
Octachlorobiphenyls, Total	55722-26-4	NA
Nonachlorobiphenyls, Total	53742-07-7	NA
PCB-77	32598-13-3	2.00E-03
PCB-81	70362-50-4	2.00E-03
PCB-105	32598-14-4	2.00E-03
PCB-114	74472-37-0	2.00E-03
PCB-118	31508-00-6	2.00E-03
PCB-123	65510-44-3	2.00E-03
PCB-126	57465-28-8	2.00E-03
PCB-156	38380-08-4	2.00E-03
PCB-157	69782-90-7	2.00E-03
PCB-167	52663-72-6	2.00E-03
PCB-169	32774-16-6	2.00E-03
PCB-189	39635-31-9	2.00E-03

* See Final DMA Work Plan (EPA 2012) for target quantitation limits
µg/kg - micrograms per kilogram
NA - Not Available

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: PCBs (CLP SOW CBC01.2)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/L)
Monochlorobiphenyls, Total	27323-18-8	NA
Dichlorobiphenyls, Total	25512-42-9	NA
Trichlorobiphenyls, Total	25323-68-6	NA
Tetrachlorobiphenyls, Total	26914-33-0	NA
Pentachlorobiphenyls, Total	25429-29-2	NA
Hexachlorobiphenyls, Total	26601-64-9	NA
Heptachlorobiphenyls, Total	28655-71-2	NA
Octachlorobiphenyls, Total	55722-26-4	NA
Nonachlorobiphenyls, Total	53742-07-7	NA
PCB-77	32598-13-3	2.00E-05
PCB-81	70362-50-4	2.00E-05
PCB-105	32598-14-4	2.00E-05
PCB-114	74472-37-0	2.00E-05
PCB-118	31508-00-6	2.00E-05
PCB-123	65510-44-3	2.00E-05
PCB-126	57465-28-8	2.00E-05
PCB-156	38380-08-4	2.00E-05
PCB-157	69782-90-7	2.00E-05
PCB-167	52663-72-6	2.00E-05
PCB-169	32774-16-6	2.00E-05
PCB-189	39635-31-9	2.00E-05

* See Final DMA Work Plan (EPA 2012) for target quantitation limits
µg/L - micrograms per liter
NA - Not Available

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Solid
Analytical Group: VOCs (CLP SOW SOM01.2))
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/kg)
1,4-Dioxane	123-91-1	1.00E+02
1,1-Dichloroethane	75-34-3	5.00E+00
1,1-Dichloroethene	75-35-4	5.00E+00
1,2-Dibromo-3-chloropropane	96-12-8	5.00E+00
1,2-Dibromoethane	106-93-4	5.00E+00
1,2-Dichlorobenzene	95-50-1	5.00E+00
1,2-Dichloroethane	107-06-2	5.00E+00
cis-1,2-Dichloroethene	156-59-2	5.00E+00
trans-1,2-Dichloroethene	156-60-5	5.00E+00
1,2-Dichloropropane	78-87-5	5.00E+00
1,3-Dichlorobenzene	541-73-1	5.00E+00
cis-1,3-Dichloropropene	10061-01-5	5.00E+00
trans-1,3-Dichloropropene	10061-02-6	5.00E+00
1,4-Dichlorobenzene	106-46-7	5.00E+00
1,1,1-Trichloroethane	71-55-6	5.00E+00
1,1,2-Trichloroethane	79-00-5	5.00E+00
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	76-13-1	5.00E+00
1,2,3-Trichlorobenzene	87-61-6	5.00E+00
1,2,4-Trichlorobenzene	120-82-1	5.00E+00
1,1,2,2-Tetrachloroethane	79-34-5	5.00E+00
2-Butanone	78-93-3	1.00E+01
2-Hexanone	591-78-6	1.00E+01
4-Methyl-2-pentanone	108-10-1	1.00E+01
Acetone	67-64-1	1.00E+01
Benzene	71-43-2	5.00E+00
Bromobenzene	108-86-1	
Bromochloromethane	74-97-5	5.00E+00
Bromodichloromethane	75-27-4	5.00E+00
Bromoform	75-25-2	5.00E+00
Bromomethane	74-83-9	5.00E+00
Carbon disulfide	75-15-0	5.00E+00

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Solid
Analytical Group: VOCs (CLP SOW SOM01.2))
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/kg)
Carbon tetrachloride	56-23-5	5.00E+00
Chlorobenzene	108-90-7	5.00E+00
Cyclohexane	110-82-7	5.00E+00
Dibromochloromethane	124-48-1	5.00E+00
Chloroethane	75-00-3	5.00E+00
Chloroform	67-66-3	5.00E+00
Chloromethane	74-87-3	5.00E+00
Dichlorodifluoromethane (Freon-12)	75-71-8	5.00E+00
Ethyl benzene	100-41-4	5.00E+00
Isopropylbenzene	98-82-8	5.00E+00
Methyl tertbutyl ether (MTBE)	1634-04-4	5.00E+00
Dichloromethane (Methylene chloride)	75-09-2	5.00E+00
Styrene	100-42-5	5.00E+00
Tetrachloroethene	127-18-4	5.00E+00
Toluene	108-88-3	1.00E+01
Trichloroethene	79-01-6	5.00E+00
Trichlorofluoromethane (Freon-11)	75-69-4	5.00E+00
Vinyl chloride	75-01-4	5.00E+00
o-Xylene	95-47-6	5.00E+00
m,p-Xylene	179601-23-1	5.00E+00

* See Final DMA Work Plan (EPA 2012) for target quantitation limits
µg/kg - micrograms per kilogram
NSV - No Screening Value Available
TBD - To Be Determined
NA - Not Available

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: VOCs (CLP SOW SOM01.2))
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/L)
1,4-Dioxane	123-91-1	1.00E+02
1,1-Dichloroethane	75-34-3	5.00E+00
1,1-Dichloroethene	75-35-4	5.00E+00
1,2-Dibromo-3-chloropropane	96-12-8	5.00E+00
1,2-Dibromoethane	106-93-4	5.00E+00
1,2-Dichlorobenzene	95-50-1	5.00E+00
1,2-Dichloroethane	107-06-2	5.00E+00
cis-1,2-Dichloroethene	156-59-2	5.00E+00
trans-1,2-Dichloroethene	156-60-5	5.00E+00
1,2-Dichloropropane	78-87-5	5.00E+00
1,3-Dichlorobenzene	541-73-1	5.00E+00
cis-1,3-Dichloropropene	10061-01-5	5.00E+00
trans-1,3-Dichloropropene	10061-02-6	5.00E+00
1,4-Dichlorobenzene	106-46-7	5.00E+00
1,1,1-Trichloroethane	71-55-6	5.00E+00
1,1,2-Trichloroethane	79-00-5	5.00E+00
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	76-13-1	5.00E+00
1,2,3-Trichlorobenzene	87-61-6	5.00E+00
1,2,4-Trichlorobenzene	120-82-1	5.00E+00
1,1,2,2-Tetrachloroethane	79-34-5	5.00E+00
2-Butanone	78-93-3	1.00E+01
2-Hexanone	591-78-6	1.00E+01
4-Methyl-2-Pentanone	108-10-1	1.00E+01
Acetone	67-64-1	1.00E+01
Benzene	71-43-2	5.00E+00
Bromochloromethane	74-97-5	5.00E+00
Bromodichloromethane	75-27-4	5.00E+00
Bromoform	75-25-2	5.00E+00
Bromomethane	74-83-9	5.00E+00
Carbon disulfide	75-15-0	5.00E+00
Carbon tetrachloride	56-23-5	5.00E+00

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: VOCs (CLP SOW SOM01.2))
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/L)
Chlorobenzene	108-90-7	5.00E+00
Cyclohexane	110-82-7	5.00E+00
Dibromochloromethane	124-48-1	5.00E+00
Chloroethane	75-00-3	5.00E+00
Chloroform	67-66-3	5.00E+00
Chloromethane	74-87-3	5.00E+00
Dichlorodifluoromethane (Freon-12)	75-71-8	5.00E+00
Ethyl benzene	100-41-4	5.00E+00
Isopropylbenzene	98-82-8	5.00E+00
Methyl tertbutyl ether (MTBE)	1634-04-4	5.00E+00
Dichloromethane (Methylene chloride)	75-09-2	5.00E+00
Styrene	100-42-5	5.00E+00
Tetrachloroethene	127-18-4	5.00E+00
Toluene	108-88-3	5.00E+00
Trichloroethene	79-01-6	5.00E+00
Trichlorofluoromethane (Freon-11)	75-69-4	5.00E+00
Vinyl chloride	75-01-4	5.00E+00
o-Xylene	95-47-6	5.00E+00
m,p-Xylene	179601-23-1	5.00E+00

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

µg/L - micrograms per liter

SAP Workseet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Solid
Analytical Group: Dioxins and Furans (CLP SOW DLM02.2)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/kg)
1,2,3,7,8-PeCDD	40321-76-4	5.00E-03
1,2,3,7,8-PeCDF	57117-41-6	5.00E-03
1,2,3,4,7,8-HxCDF	70648-26-9	5.00E-03
1,2,3,4,7,8-HxCDD	39227-28-6	5.00E-03
1,2,3,6,7,8-HxCDD	57653-85-7	5.00E-03
1,2,3,7,8,9,-HxCDD	19408-74-3	5.00E-03
1,2,3,6,7,8,-HxCDF	57117-44-9	5.00E-03
1,2,3,7,8,9,-HxCDF	72918-21-9	5.00E-03
1,2,3,4,6,7,8-HpCDD	35822-46-9	5.00E-03
1,2,3,4,6,7,8-HpCDF	67562-39-4	5.00E-03
1,2,3,4,7,8,9-HpCDF	55673-89-7	5.00E-03
2,3,7,8-TCDD	1746-01-6	1.00E-03
2,3,7,8-TCDF	51207-31-9	1.00E-03
2,3,4,7,8-PeCDF	57117-31-4	5.00E-03
2,3,4,6,7,8,-HxCDF	60851-34-5	5.00E-03
OCDD	3268-87-9	1.00E-02
OCDF	39001-02-0	1.00E-02

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

µg/kg - micrograms per kilogram

NSV - No Screening Value Available

SAP Workseet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: Dioxins and Furans (CLP SOW DLM02.2)
Concentration Level: Low

Analyte	CAS Number	Contract Required Quantitation Limits (µg/L)
1,2,3,7,8-PeCDD	40321-76-4	5.00E-05
1,2,3,7,8-PeCDF	57117-41-6	5.00E-05
1,2,3,4,7,8-HxCDF	70648-26-9	5.00E-05
1,2,3,4,7,8-HxCDD	39227-28-6	5.00E-05
1,2,3,6,7,8-HxCDD	57653-85-7	5.00E-05
1,2,3,7,8,9,-HxCDD	19408-74-3	5.00E-05
1,2,3,6,7,8,-HxCDF	57117-44-9	5.00E-05
1,2,3,7,8,9,-HxCDF	72918-21-9	5.00E-05
1,2,3,4,6,7,8-HpCDD	35822-46-9	5.00E-05
1,2,3,4,6,7,8-HpCDF	67562-39-4	5.00E-05
1,2,3,4,7,8,9-HpCDF	55673-89-7	5.00E-05
2,3,7,8-TCDD	1746-01-6	1.00E-05
2,3,7,8-TCDF	51207-31-9	1.00E-05
2,3,4,7,8-PeCDF	57117-31-4	5.00E-05
2,3,4,6,7,8,-HxCDF	60851-34-5	5.00E-05
OCDD	3268-87-9	1.00E-04
OCDF	39001-02-0	1.00E-04

* See Final DMA Work Plan (EPA 2012) for target quantitation limits

µg/L - micrograms per liter

NSV - No Screening Value Available

SAP Worksheet #15 - Reference Limits and Evaluation Table

Laboratory:
Matrix: Aqueous
Analytical Group: General Water Quality/Anions
Concentration Level: Standard

Analyte	Method	CAS Number	Laboratory-specific quantitation limit (mg/L)*	Laboratory-specific detection limit (mg/L)*
Alkalinity	E310.1	NA	5.00E+00	NA
Total Dissolved Solids	E160.1	NA	1.00E+01	5.40E+00
Bromide	E300	7726-95-6	5.00E-01	8.80E-02
Chloride	E300	16887-00-6	1.00E+00	3.70E-02
Fluoride	E300	7782-41-4	5.00E-01	5.90E-02
Nitrogen, Nitrate (as N)	E300	14797-55-8	5.00E-02	2.20E-02
Nitrogen, Nitrite	E300	14797-65-0	5.00E-02	1.60E-02
Sulfate (as SO_4)	E300	18785-72-3	1.00E+00	4.90E-02
Orthophosphate	E300		2.00E-01	7.70E-02
Perchlorate	E6850	14797-73-0	5.00E-04	8.20E-05
Monochloroacetic acid	EPA 552.2	79-11-8	2.00E+00	4.00E-01
Monobromoacetic acid	EPA 552.2	79-08-3	1.00E+00	7.50E-01
Dichloroacetic acid	EPA 552.2	79-43-6	1.00E+00	9.80E-01
Dibromoacetic acid	EPA 552.2	631-34-1	1.00E+00	3.80E-01
Trichloroacetic acid	EPA 552.2	76-03-9	1.00E+00	3.80E-01

* Example from Final DMA Work Plan (EPA 2012), actual value will be per laboratory SOP

mg/kg - milligrams per liter

NA - Not Available

NSV - No Screening Value Available