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REPORT TRANSMITTAL

August 26, 2014

To: US Magnesium Site Team

From: Catherine LeCours, PWT Project Manager

Re: Technical Memorandum for Oversight of the Phase 1A Remedial Investigation in PRI Areas 2 and 8 through 17

Enclosed please find 13 compact disk(s) containing the above-referenced document.

The Technical Memorandum details the oversight and split sampling activities conducted by PWT, with support from Tetra Tech Inc., during the Phase 1A event between October 2013 and May 2014. The report does not include analytical results and only focuses on the field activities.

Please don't hesitate to contact me with any questions.

Ken W distributed to RI-team
+ to Dave Williams, BLM-Denver
+ to Steven Moores, Leg/Enf.

Technical Memorandum
for Oversight of the Phase 1A Remedial Investigation in PRI Areas 2 and 8 through 17

US Magnesium NPL Site
EPA Site ID. NO. UTN000802704
Tooele County, Utah

August 19, 2014

Prepared for:

U.S. EPA Region 8
Denver, Colorado

Prepared by:

PWT RAC TEAM

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ACRONYMS AND ABBREVIATIONS

ATV	All-terrain vehicles
bgs	Below ground surface
BLM	Bureau of Land Management
CN	Cyanide
COPC	Contaminant of potential concern
EPA	U.S. Environmental Protection Agency
ERM	Environmental Resource Management
GPS	Global Positioning System
HASP	Health and Safety Plan
HCl	hydrogen chloride (gas)
HDPE	High-density polyethylene
ID	Identification
IDW	Investigation-derived waste
mg/L	Milligrams per liter
mL	Milliliter
mL/min	Milliliter per minute
MS/MSD	Matrix spike /Matrix spike duplicate
NaOH	Sodium hydroxide
OS	Oversight
OSC	On-Scene Coordinator
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCDD/PCDF	Polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Parts per million
PRI	Preliminary remedial investigation
PVC	Polyvinyl chloride
PWT	Pacific Western Technologies
QAPP	Quality Assurance Project Plan
QC	Quality control
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
Site	US Magnesium Site
SOP	Standard operating procedure
SVOC	Semi-volatile organic compound
TOC	Total organic carbon
UFP	Uniform Federal Policy
VOC	Volatile organic compound
WS	Worksheet

1.0 INTRODUCTION

This Technical Memorandum for Oversight of the Phase 1A Remedial Investigation in PRI Areas 2 and 8 through 17 (Technical Memorandum) summarizes the U.S. Environmental Protection Agency, Region 8 (EPA), and EPA's contractor, Pacific Western Technologies, Ltd. (PWT), split sampling and field oversight activities conducted during Phase 1A of the Remedial Investigation (RI) at the US Magnesium National Priority List Site in Tooele County, Utah (Site) (Figure 1). The oversight activities were conducted to ensure that the Responsible Party, US Magnesium, and US Magnesium's contractor, Environmental Resource Management (ERM), were implementing the Phase 1A RI in accordance with the *Phase 1A Remedial Investigation Sampling and Analysis Plan to Identify Chemicals of Potential Concern in Soils, Sediment, Solid Waste, Water and Air, and Receptor Surveys; Revision 0 for PRI Areas 2 and 8 through 17* (Phase 1A RI SAP) (EPA 2013a).

The Phase 1A RI SAP presents the objectives, approach, evaluation criteria, and scope of work to be conducted by US Magnesium/ERM for Phase 1A of the RI for the Site. Phase 1A of the RI was performed to fully characterize contaminant types in order to select contaminants of potential concern (COPC) in solid and aqueous media for assessments of risk to human and ecological receptors. The air investigation and receptor survey portions of Phase 1A are not included in this Technical Memorandum.

The initial portion of the Phase 1A RI included preliminary remedial investigation (PRI) Areas 2 and 8 through 17. The implementation of portions of the Phase 1A sampling for other areas of the Site (PRI Areas 1 and 3 through 7) has been postponed in order to consider alternative approaches to accomplishing RI objectives for these areas.

The Phase 1A RI field activities for PRI Areas 2 and 8 through 17 were completed between November 2013 and May 2014. This Technical Memorandum is limited to observations and findings made during field activities and is not intended to address the reproducibility of analytical results and/or limitations in analytical and data management protocols related objectives stated in the *Phase 1A Remedial Investigation Oversight Quality Assurance Project Plan* (Phase 1A OS QAPP) (EPA 2013b). If directed by the EPA, PWT will prepare a separate oversight split sampling report to include analytical data from split samples, address the reproducibility of analytical results, and discuss limitations in analytical and data management protocols regarding the objectives stated in the Phase 1A OS QAPP.

The Phase 1A RI field effort was conducted by ERM. Conduct of the EPA's oversight was performed by PWT (with support from Tetra Tech, Inc.), under EPA Contract No. EP-W-06-006, Work Assignment No. 130-RDSB-08PU. The combined field team of ERM and PWT personnel is referred to as the Field Team throughout this Technical Memorandum. Field activities conducted in PRI Areas 2 and 8 through 17 during the Phase 1A RI included surface and subsurface solids sampling, surface water sampling, staff gauge installation and monitoring, groundwater monitoring well installation, and groundwater monitoring. PWT conducted oversight of most activities associated with the Phase 1A RI and accepted split samples of solid and aqueous media for independent laboratory analysis.

Table 1 identifies the samples and split samples collected from each PRI area. Although PRI Area 17 includes all Site water, Table 1 and this Technical Memorandum present the surface water oversight activities and split samples within the individual PRI areas and compile the groundwater oversight activities and split samples as PRI Area 17.

1.1 PHASE 1A RI GENERAL SPLIT SAMPLING AND OVERSIGHT APPROACH

Split sampling and oversight of US Magnesium/ERM's field activities during the Phase 1A RI was conducted by EPA/PWT in accordance with the Phase 1A OS QAPP. The overall objectives for the Phase 1A RI oversight and split sampling program were to substantively oversee US Magnesium/ERM's field activities and collect splits of a minimum of 10 percent of the samples collected by US Magnesium/ERM for the solid and aqueous media. The objective of the EPA/PWT field oversight program was to confirm that US Magnesium/ERM implemented the field activities pursuant to the EPA-approved plans. The objective of the EPA/PWT split sampling program is to confirm that the US Magnesium/ERM sample analytical results are reproducible. In order to produce results that can be used to evaluate reproducibility, the EPA/PWT oversight verified the sampling strategy performed by US Magnesium/ERM was conducted so that:

- Samples were collected from specified media and sampling horizons at required sampling locations using EPA-approved Standard Operating Procedures (SOPs);
- Sufficient sample volume was collected such that investigative, QC, and split samples were obtained from each location;
- Sample processing in the field provides representative samples; and
- Split samples provided to the EPA/PWT are representative of US Magnesium/ERM samples.

The following is a list of oversight tasks conducted by PWT during the Phase 1A RI:

- Oversee field activities for adherence to EPA-approved project planning documents;
- Oversee the on-site reconnaissance/sieving events;
- Approve any minor modifications of the sampling locations;
- Oversee the geophysical survey of the landfill;
- Observe and document ERM sample collection and processing activities;
- Oversee drilling, borehole logging, and well installation and development activities;
- Accept split samples of soil, sediment, solid waste, surface water, and groundwater;
- Oversee sample labeling and sample location documentation;
- Collect oversight photographic documentation;
- Consult with ERM field staff regarding potential field modifications that ERM may seek from the EPA/PWT, in order for PWT to advise the EPA regarding actions on such requests;

- Consult with and advise the EPA regarding field/Site situations that may warrant the EPA considerations for issuing appropriate Phase 1A RI SAP and/or Phase 1A OS QAPP modification(s);
- Analyze split samples of solid and aqueous media;
- Audit up to two ERM-contracted laboratories to evaluate the compliance with requirements of the Phase 1A RI SAP;
- Verify and validate split sample data; and
- Manage split sample data and the associated documentation.

The oversight activities for the geophysical survey of the landfill are detailed in the *Landfill Geophysical Survey Field Oversight Report* (EPA 2014) and not repeated herein. The analysis of the split samples, laboratory audit reports, verification/validation of the split sample data, and management of the data/documentation are not discussed in this Technical Memorandum.

1.2 SUMMARY OF FIELD OVERSIGHT ACTIVITIES AND SPLIT SAMPLE COLLECTION

During the Phase 1A RI, the following field tasks were completed by ERM:

- Reconnaissance of proposed sample locations;
- Collection of eight solids samples from each PRI area for fine fraction analysis;
- Collection of 145 surface solids samples from 144 locations[1];
- Collection of 16 surface water samples from 16 locations;
- Geophysical survey of the landfill;
- Advancement of soil borings at six locations;
- Collection of 34 subsurface solids samples from six locations;
- Installation and development of 12 new groundwater monitoring wells;
- Re-development of 19 existing groundwater wells;
- Collection of 31 groundwater samples from 19 existing and 12 new wells;
- Installation of five staff gauges in the wastewater ponds;
- Survey of new groundwater monitoring wells and staff gauges; and
- Monitoring of groundwater and surface water elevations on a monthly basis.

Phase 1A RI field activities were conducted in 14 of the 17 PRI areas (PRI Areas 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17). In this Technical Memorandum, the solid and surface water sampling activities are reported under each separate PRI area while the site-wide groundwater sampling activities are reported under PRI Area 17, Site-Wide Water.

For the Phase 1A RI SAP, a systematic sampling approach was used. A grid pattern was selected for identifying sample locations where the starting point for the grid was selected at random. After this, some sample locations were added or adjusted (biased) to reflect suspect locations of

[1] Refer to Section 2.5.11.3 for description of additional sample.

potential contamination sources of COPCs using professional judgment. Reconnaissance of sampling locations was conducted prior to the actual Phase 1A RI field sampling event. During the reconnaissance, eight solids sieve samples were collected from each PRI area for grain size analysis to determine if sufficient fines are present to warrant the need for separate fine fraction versus bulk analysis as described in Worksheet 11 of the Phase 1A RI SAP. Analysis of sieve samples indicated the need for separate fine fraction analysis at 40 of the 144 surface solids sample locations.

ERM completed the Phase 1A RI field activities with up to three separate field teams working concurrently. The ERM field teams generally consisted of a groundwater well installation/development team, a water sampling team, and a soil sampling team. During Phase 1A of the RI, PWT had one to two oversight personnel on site nearly every day and provided oversight for as much of the field activities as possible. Mr. Aaron Baird, PWT Field Team Leader, performed the majority of the EPA field oversight. Ms. Catherine LeCours, PWT Project Manager, was on site the week of May 5, 2014, to oversee the borehole drilling and collection of all subsurface solids samples in PRI Areas 2 and 10. Mr. Robert Howe, Tetra Tech Geochemist, was on site the week of December 2, 2013, to observe installation of select monitoring wells. When PWT had one field person and ERM had more than one field team working, PWT focused on the sample collection team and the associated split samples for PWT; not the groundwater well gauging or development activities. ERM conducted 58 days of field activities and PWT was on site for 48 of those days (83 percent). The specific oversight activities conducted by PWT during the Phase 1A RI are summarized below.

PWT accepted split samples from at least 10 percent of the surface solids samples in each PRI area, accepted one subsurface solids split sample from each subsurface boring, and accepted split samples from at least 20 percent of the water samples (PRI Area 17). This resulted in 24 split samples of surface solids, 9 split samples of subsurface solids, 8 surface water split samples, and 6 groundwater split samples. Table 1 details information regarding each sample and split sample accepted; including location identification, media, number of samples, rationale, split sample number and date of sample collection. Table 2 provides the tally and percent calculations for the split and quality control (QC) samples obtained by PWT. Figures 2 through 5 show the locations of the split samples accepted by PWT: Figure 2 – Surface Solids; Figure 3 – Subsurface Solids; Figure 4 – Surface Water; and Figure 5 – Groundwater.

A minimum of two split samples of surface solids were accepted from each PRI area (except PRI Area 17) to assess reproducibility. PWT primarily selected locations for surface solids split samples randomly; however, used professional judgment considering one or more of the following factors in certain cases: (1) target a saturated solids sample (which includes volatile organic compounds [VOC] analysis); (2) get split samples from different areas or surface soil types within the PRI area; and (3) get split samples from the high or low end of the concentration range using whatever information was available to suggest the level of contamination. For subsurface solids split samples, the specific sampling interval within each boring was based on obtaining a split sample from the interval of interest (e.g. native soil at PRI Area 2) and was also dependent on available solids volume from the specific intervals (two subsurface solids split samples were obtained across more than one sample interval to get enough sample volume to fill all sample containers). PWT split samples of surface water and groundwater were selected randomly. Field duplicate locations were selected randomly. One matrix spike/matrix spike

duplicate (MS/MSD) volume was collected for each analysis for each matrix, and one trip blank was included in each VOC analysis sample shipment container. The location identification numbers were assigned based on the PRI and the sample matrix type (EPA 2013b).

Surface solids samples in PRI Areas 11, 15 and 16 were collected from 0 to 2 inches from typically 5 grab sample aliquots using a 4-inch by 4-inch flat-bottom scoop. Surface solids samples in PRI Areas 8, 9, 10, 12, 13, and 14 were collected from 0 to 6 inches from typically 5 grab sample aliquots using a hand auger with a 6-inch by 3.5-inch auger bucket. Subsurface solids samples from locations PRI8-017 and PRI14-005 were collected using the direct-push drilling method and subsurface solids samples from locations PRI10-008, PRI2-006, PRI2-009, and PRI2-014 were collected using the sonic drilling method. Solids samples were sieved, homogenized, and processed by ERM in accordance with the procedures identified in the Phase 1A RI SAP.

In accordance with the Data Quality Objectives, split solids samples were obtained by providing a sample container to ERM and having them fill the container after all field sample processing had been completed. PWT accepted split solids samples in the field from the post-processed sample volume; however, the split solids samples for VOCs were collected by ERM at the point of sample collection, and were not processed pursuant to ERM's SOP USM-01. PWT classified and logged all split solids samples according to the Unified Soil Classification System.

For VOCs in saturated solids and water, ERM filled their sample containers first, then filled the split sample containers; all other sample aliquots were generally filled concurrently to the extent possible. ERM only used one laboratory for sample chemical analysis; therefore, ERM was able to consolidate multiple analytical groups into one container and typically required a lower sample volume. PWT used five different laboratories and as a result, required more sample containers and a larger sample volume overall.

The Phase 1A OS QAPP indicated PWT was to provide a sample container to ERM and have ERM fill the sample container <u>after</u> all field sample processing had been completed. ERM would perform any sample testing and balancing/preservation procedure needed for the split samples. PWT would accept the filled/processed/preserved sample containers from ERM and prepare the containers for shipping. However, on November 21, 2013, (after the collection of two surface water samples), the EPA directed PWT to observe ERM sample preservation and try to replicate the actions for the split samples. Therefore, field testing, pH buffering, and post-collection preservation of aqueous samples on and after November 21, 2013, was done independently. Most aqueous samples collected during the Phase 1A RI required additional sodium hydroxide (NaOH) to stabilize the cyanide (CN) fraction to a pH of greater than 12.

The ERM samples were submitted to one lab, TestAmerica in Sacramento, California. The split samples were submitted to three EPA Analytical Program laboratories and two commercial laboratories to be analyzed for the full suites of target analytes by the standard methods that have been identified for the Phase 1A RI. The breakdown of laboratories for split samples analyses is detailed in Table 3.

PWT used field log books (Appendix A), split sampling data sheets (Appendix B), photographs (Appendix C), and Site maps to document sample and split sample locations, field observations,

monitoring results, events that occurred during field activities, and deviations from the Phase 1A RI SAP and Phase 1A OS QAPP. A split sampling field data sheet was completed for each sample collected by PWT (Appendix B). Numerous photographs and videos were taken by PWT to document Phase 1A RI field activities and observations. Only photographs pertinent to this report are presented in Appendix C; additional photographs and/or videos will be provided upon request. Sampling Field Data Sheets, photographs, chains-of-custody, and log book entries were managed according to the Phase 1A OS QAPP. A Scribe database project was established to track sample collection, generate chains-of-custody, and receive data from the laboratories.

2.0 PHASE 1A REMEDIAL INVESTIGATION FIELD OBSERVATIONS

2.1 DEVIATIONS FROM PHASE 1A OS QAPP

During Phase 1A, no Phase 1A OS QAPP modifications were proposed. There were deviations from the Phase 1A OS QAPP and they were considered field modifications (location or sample specific); therefore no Record of Uniform Federal Policy (UFP) QAPP-SAP Modification forms were prepared for the deviations. Presented below is a summary of the deviations from the Phase 1A OS QAPP. Deviations associated directly with a PRI or sample are discussed in the PRI-specific sections.

Table 12-1 and Table 20-1 state that field duplicates will be collected at a frequency of 10 percent for solid and aqueous media. During the Phase 1A RI for PRI Areas 2 and 8 through 17, PWT collected two field duplicates of solids samples, a frequency of 6 percent, and one field duplicate of water samples, a frequency of 7 percent. The percentage of field duplicates is below the minimum frequency criteria stated in the Phase 1A OS QAPP of 10 percent; however, the lack of EPA field duplicates will not limit the usability of the data in meeting the data quality objectives. The comparison of EPA's split data to that of ERM's data will provide additional information regarding field precision and media homogeneity.

In Worksheet (WS) #15, CN is listed as one of the required analytes for all solids samples. Analysis for CN and the other additional metals (mercury and molybdenum) was specifically stated on the initial chain-of-custody forms for the subcontracted laboratory. After discussion with the laboratory, the chain-of-custody was simplified to indicate "metals;" however, once abbreviated to "metals" the laboratory no longer included CN for analysis. As a result of this miscommunication, there are no CN results for 24 of the 33 split solids samples collected.

In WS#17, Section 17.2 states that ERM will perform any sample testing and balancing/preservation procedure needed for the split samples. However, ERM did not perform the sample testing and balancing/preservation procedure for the split samples collected on and after November 21, 2013 and testing and balancing/preservation were performed by PWT.

In WS #17, Section 17.3 states that samples will be shipped or hand delivered to the laboratory within 24 hours of sample collection. Due to delays with EPA Analytical Program lab assignments, there was a significant delay in the shipment of polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDDs/PCDFs), total dissolved solids, and pH sample fractions from samples collected in November 2013. In addition, there were times when PWT was unable to make the FedEx drop off deadline and therefore

samples were shipped the following day. Shipping delays may have impacted holding times for approximately five sample delivery groups.

Table 19-1 states the total organic carbon (TOC) water sample container size and type as 1-500 milliliter (mL) high-density polyethylene (HDPE) bottle. The laboratory requested PWT to submit 3-40 mL amber glass vials for TOC.

In WS#27, Section 27.1 states that the sample naming convention for the split samples will use the same root name of the investigative sample that is used by ERM and identified in WS#27 of the Phase 1A RI SAP. The example presented in the Phase 1A OS QAPP for split sample identification (ID) for a surface solids sample was PRI##-xx-SSyy-MMDDYY-ES01. For one digit PRI numbers, such as PRI Area 2, ERM did not include the 0 before the 2 (i.e. PRI02), instead identifying the sample location as PRI2. Also, for the sample location ID, ERM listed the 3 digit sample location ID (i.e. PRI2-001). For split sample IDs, the same PRI number scheme was used the majority of the time with only two digits for the sample location ID (i.e. PRI2-01). However, a limited number of solid and surface water samples do have a two digit PRI number scheme (i.e. PRI08-15). Groundwater sample IDs matched that stated in the Phase 1A OS QAPP.

WS#33, Table 33-1, states that PWT is to submit a monthly status report to document field activity oversight. However, since the November and December 2013 event was just over 4 weeks, PWT prepared a single "year end" summary. PWT submitted the 2013 summary report on January 7, 2014. PWT did not submit monthly reports in 2014 as field activities were conducted sporadically and of short duration. And the weekly status reports were sufficient for the EPA.

2.2 DEVIATIONS FROM THE PHASE 1A RI SAP

During the Phase 1A RI, 21 field modifications (14C-1-1 through 14C-1-21) and 21 Record of UFPQAPP-SAP Modifications (14C-2-1 through 14C-2-21) were proposed by ERM, EPA, or PWT and approved by the EPA. The field modifications are summarized in Table 4 and the Record of UFPQAPP-SAP Modifications are included in Attachment 17B of the Phase 1A RI SAP. The field and Phase 1A RI SAP modifications are discussed where applicable throughout this Technical Memorandum. Presented below is a summary of the deviations from the Phase 1A RI SAP that were not specifically addressed with a modification. Deviations associated directly with an individual PRI or sample are discussed in the PRI-specific sections.

In WS#11, Step 7 states that the top 6 inches of each core will be removed and evaluated as a surficial sample, and the remainder of the core will be divided into 2-foot sections that extend from the 6-inch depth to total depth of the boring. This statement, along with Table 14-3 in WS#14, implies that the surface solids sample at collocated subsurface solids sample locations will be collected from the top 6 inches of the subsurface boring core. However, surface solids samples collocated with subsurface solids samples were collected with the 5 hand auger aliquots method (used for most surface solid samples) and were not collected at the same time as the borings. Attempts were made by ERM to collect the surface solids samples as close to the boring locations as possible.

Table 12-1 states that equipment rinsate samples will be collected at a frequency of 1 per day per sampling team. Note 'a' of Table 12-1 states that equipment rinsate samples will be collected at a frequency of 1 per week per type of non-dedicated sample collection equipment used. ERM collected equipment rinsate samples at a frequency of 1 per week per type of non-dedicated sample collection equipment used.

Note 'a' of Table 12-1 also states that analytically certified, organic-free water (or equivalent) will be used for organic parameters equipment rinsate sample fractions, and deionized or distilled water will be used for inorganic parameters fractions. To PWT's knowledge, only one type of water from one source was used for equipment decontamination and all rinsate sample fractions and ERM could not confirm that the deionized water being used was organic-free water or equivalent.

In WS#14, Section 14.3.1, as well as in SOP USM-01 *Surface Soil, Sediment, and Waste Sampling*, states that at PRI Areas 11, 12, 15, and 16 solids samples will be collected from the top 2 inches of material. However, the top 6 inches of material was collected at PRI Area 12 because field observations suggested the materials present at most of the sampling locations in PRI Area 12 were more representative of waste samples and not solely air deposition.

PWT noted the following differences between what is stated in WS#19, Table 19-1, for aqueous sample containers and what ERM used in the field:

- 250 mL HDPE bottles used for TOC rather than 500 mL HDPE;
- 500 mL HDPE bottles used for CN rather 250 mL HDPE; and
- the sample container for hexavalent chromium had ammonium sulfate preservative and the table does not specify a chemical preservative.

In WS#27, Section 27.1 states that coolers will be delivered to the FedEx shipping center at the Salt Lake City International Airport on a daily basis. PWT understands that ERM typically shipped samples to the laboratory every other day.

In WS#27, Section 27.1, the example presented for surface solids sample identification is PRI##-xx-SSyy-MMDDYY and it is stated that the PRI##-xx is the location ID, as identified in WS#14. The sample location ID specified in WS#14, which has a PRI#-xxx format, was used rather than the PRI##-xx format. For one digit PRI numbers, the sample location ID format used in WS#14 does not include the 0 placeholder before the PRI # (i.e. PRI2 rather than PRI02). Also, the sample location ID format used in WS#14 has 3 digit sample location IDs (i.e. PRI2-001 rather than PRI2-01). This affected the sample IDs for solids and surface water sample IDs; groundwater sample ID matched that stated in the Phase 1A RI SAP.

SOP USM-01 *Surface Soil, Sediment, and Waste Sampling*, states the horizontal dimensions of the surface solid samples shall be a 6-inch square. However, the dimensions were approximately a 4-inch square or a 4-inch by 6-inch rectangle when additional volume was required.

2.3 OBSERVATIONS AND OTHER FIELD ACTIVITIES

2.3.1 Reconnaissance of Sampling Locations and Collection of Sieve Samples

On October 4, 2013, PWT was on site to oversee one day of sample location reconnaissance and sieve sample collection activities and approve any minor modifications of the sampling locations identified in the Phase 1A RI SAP. ERM divided each PRI into four quadrants of approximately even size and identified two Phase 1A target sampling stations within each quadrant at random for collection of sieve samples. PWT observed sample location reconnaissance at six locations in PRI Areas 13 and 14 (PRI13-012, PRI13-013, PRI13-014, PRI14-001, PRI14-002, and PRI14-003) and the collection of surface solids sieve samples at three of those locations (PRI13-013, PRI14-002, and PRI14-003). The distance between the Phase 1A RI sample location and the sieve sample location ranged between approximately 10 and 20 meters and the sieve sample location appeared to have the same surface soil type as that of the corresponding Phase 1A RI sample location. Wooden stakes identifying the sampling locations were placed at each sampling location.

The sieve sample locations were randomly selected and therefore ERM did not consider surface soil type in their selection of sample locations. The sieve sample locations may not have been representative of all the different areas and surface soil types within the PRIs; PWT did not attempt to confirm this. ERM did not have an SOP for the sampling and sieving strategy; this work was completed by ERM consistent with WS#11, Section 11.3.1, Step 7 of the Phase 1A RI SAP. Record of UFPQAPP-SAP Modification form numbers 14C-2-9, 14C-2-10, and 14C-2-13-1 through 4 provide rationale and approval for modifications to the sampling locations.

2.3.2 Sample Processing at the Muskrat Fire Station

On September 13, 2013, the EPA entered into an agreement with the U.S. Department of Interior, Bureau of Land Management (BLM), with respect to use of the Muskrat Fire Station in Tooele County, Utah. The fire station is located at 2043 South Skull Valley Hwy in Grantsville, Utah, approximately 18 miles south of the U.S. Magnesium Site. On November 14, 2013, PWT delivered an office trailer to the Muskrat Fire Station along with a portable generator. At the office trailer, PWT packaged samples, prepared sample labels and chain of custody forms, and prepared sample coolers for shipment.

2.3.3 Breach of Wastewater from PRI Area 6 into PRI Area 8

Beginning in November 2013, there was a significant breach of wastewater from PRI Area 6 into PRI Area 8. This breach was first observed by PWT on November 25, 2013, while attempting to access sample location PRI8-005 (Photo 1, Appendix C). During Phase 1A sampling in November and December 2013, ERM was unable to collect 6 of the required 14 surface solids samples in PRI Area 8 (the area NW of the PRI Area 6 active pond) because the area had become inundated with wastewater to a depth between 1 to 6 inches (24 inches in the ‘angel wing’ area) that had a pH of approximately 1 (Photos 2, 3, and 4, Appendix C). As this water extended northward, the water streamed beyond US Magnesium property onto BLM-Federal land. ERM noted in their daily reports to EPA that they were unable to sample at certain locations (PRI8-005, PRI8-006, PRI8-101, and PRI8-17) due to the presence of water.

On February 5, 2014, PWT field personnel accompanied Shun-Ping Chau, EPA On-Scene Coordinator (OSC), to PRI Area 8 to document the breach of wastewater from PRI Area 6 onto BLM-owned land. The OSC measured the pH of the surface water with litmus paper at numerous points in the BLM tract during her reconnaissance and PWT recorded global positioning system (GPS) coordinates at OSC-requested locations along the perimeter of the surface water. On February 21, 2014, the EPA issued a RCRA 7003 Administrative Order on Consent to US Magnesium to address the spill of wastewater onto BLM land in PRI Area 8. On March 24, 2014, PWT observed that US Magnesium had constructed a 5-strand barbed wire fence around the perimeter of the wastewater impact on BLM land (Photo 5, Appendix C).

Since the breach of November 2013, US Magnesium has used snow shoe refractories (heat-resistant bricks that constitute the linings for the molten magnesium casts) and other debris to widen and reinforce the road between PRI Area 6 and PRI Area 8. PWT observed the US Magnesium excavator working on the road on multiple occasions during the Phase 1A field activities. Despite efforts by US Magnesium to improve the road, it did not appear to be effective in preventing the migration of wastewater from PRI Area 6 into PRI Area 8. Wastewater seeps on the north side of the road, in PRI Area 8, continued to flow as noted during field activities through May 2014.

By March 24, 2014, the wastewater level in PRI Area 8 had receded (Photos 6, 7, and 8, Appendix C) and the pH of the surface water in the 'angel wing' area was measured with a pH test strip (pH litmus paper) at 6.

2.3.4 Breach of Wastewater from PRI Area 6 into PRI Area 7

Between February and March 2014, PWT observed a significant breach in wastewater from PRI Area 6 into PRI Area 7. Evidence of the breach was first observed on February 4, 2014, when the PWT field person observed a sink hole in the isthmus road (dirt road that runs north/south between PRI Areas 5/6 and 7) and accumulation of wastewater in depressions along the west side of the road. At this time, higher water levels on the west side of the wastewater ponds in PRI Areas 5 and 6 were also observed. On March 5 and 6, 2014, PWT observed an excavator doing earthwork along the isthmus road in the area by piezometer PZ-08. PWT also noticed significantly more surface water in PRI Area 7 than during previous field visits. On March 24, 2014, when ERM was collecting a depth to water measurement in piezometer PZ-06 (northeast corner of PRI Area 7), the ERM field personnel also noticed the significant increase in the amount of surface water in the northeastern and eastern portion of PRI Area 7. ERM tested the surface water with a pH test strip near PZ-06 and it had a pH of 1. On March 25, 2014, the PWT field person drove down the isthmus road between PRI Areas 6 and 7 and noticed that there had been significant earthwork in the area around piezometer PZ-08. PWT observed a sink hole on the east side of the road, increased surface water in PRI Area 7, and a recently constructed soil berm with a black liner on the east side of the road. Photographs related to these field observations are included in Appendix C.

2.3.5 Wind and Stack Emissions Observations

Wind conditions at the Site were highly variable, resulting in an inconsistent pattern of air releases. Under windy conditions, the stack releases moved in the downwind direction and the 'white haze' of the stack plume dissipated in approximately one mile downwind. At times, the stack plume exhibited "looping" behavior whereby the plume reaches the ground relatively near the stack. Under calm conditions, the stack plume dissipates slowly and was observed well beyond the 5-mile radius preliminary study boundary in all directions. On two occasions during the Phase 1A activities, with a strong north wind, chlorine gas could be noted (smelled) by PWT3 personnel as far south as the Muskrat Fire Station (approximately 18 miles away). The stack plume was also observed settling into the valleys of the Lakeside Mountains (Photo 12, Appendix C).

2.3.6 Wildlife Observations

Different wildlife species were observed in and around the US Magnesium facility as well as signs such as tracks, scat, burrows, nests, etc. Significant observations are described here. Deceased gulls and ravens were observed on multiple occasions. On November 25, 2013, what appeared to be raccoon tracks were observed leading to and from the gypsum slurry water stream on the gypsum pile (Photo 13, Appendix C). On March 24, 2014, a Golden Eagle was observed perched on top of a soil stockpile in the southwest corner of PRI Area 10. On May 8, 2014, numerous American Avocets were observed in and around the surface water in the "angel wing" area of PRI Area 8 (Photo 14, Appendix C). Coyotes and antelope were also observed on many occasions. In addition, cattle were observed grazing in PRI Areas 8, 14, 15, and 16.

2.3.7 Staff Gauge Installation

The Phase 1A RI SAP required the installation of 5 staff gauges (SG-1 through SG-5) for measuring water levels in the ponded waste lagoons. On December 11, 2013, PWT observed the installation of staff gauge SG-3 in PRI Area 6 and staff gauges SG-4 and SG-5 in PRI Area 5 (Photos 15 and 16, Appendix C). ERM drove a 10-foot section of Schedule 80 polyvinyl chloride (PVC) pipe into the ground. Once the pipe was in place, ERM attached two one meter staffing gauges (stacked vertically) to the pipe with the bottom of the lower gauge on the surface of the sediment. A floating dock was used to install the staff gauges in the ponded waste lagoons. Staff gauges were installed approximately 10 feet from the shoreline at the time of installation. Those installations observed by PWT3 were performed in accordance with Record of UFPQAPP-SAP Modification 14C-2-10. PWT did not observe ERM's collection of monthly staff gauge surface water level measurements.

2.3.8 Field Instrument Calibration

ERM used three field instruments during the Phase 1A sampling activities that required calibration in the field; a spectrophotometer, a water quality meter, and a photoionization detector (PID). PWT observed ERM calibrating each of these instruments on at least one occasion. Calibration of the HACH DR 800 Series Spectrophotometer was performed prior to use at each water sample location in accordance with WS#22, Table 22-1. The Horiba U-52 Water Quality Meter was calibrated in the morning prior to each new day of use in accordance

with WS#22, Table 22-2. Calibration of the MiniRae 3000 PID was performed prior to each new day of use in accordance with WS#22, Table 22-3.

2.3.9 Field Sampling Equipment Decontamination

All field sampling equipment was decontaminated in general accordance with SOP USM-03, *Equipment Decontamination*. ERM set up a decontamination station in the lavatory facilities of the on-site office trailer. The lavatory facilities were dedicated for decontamination purposes only and not used for personal sanitation. In general, all non-disposable sampling equipment was decontaminated at the office trailer before and after sampling at each field location. Soil and groundwater sampling tools were decontaminated by scrubbing in a solution of potable water and non-phosphate detergent (Liquinox). The tools were then rinsed with potable water, rinsed with isopropyl alcohol, and finally rinsed with deionized water. Sampling tools not used immediately after decontamination were allowed to air dry on metal racks in the office trailer. Clean equipment was then placed in plastic bags. No sampling supplies/equipment was dedicated at any of the sampling locations, with the exception of the two metal bowls used to create a surface water sampling basin at location PRI14-005.

On December 13, 2013, PWT witnessed the collection of the first equipment blank from the surface solids sampling equipment (auger bucket, flat-bottom scoop, sieve, and steel tray). ERM's SOP USM-03 does not provide detail to the collection of equipment blank rinse water. The decontaminated sampling equipment was placed on a tray and deionized water was poured over all the equipment at the same time and a plastic funnel was used to capture the water dripping from the corner of the tray to fill the sample bottles (Photo 17, Appendix C). The equipment blank collection procedures were conducted in accordance with SOP USM-03, *Equipment Decontamination,* and at a frequency of one per week as specified in Record of UFPQAPP-SAP Modification 14C-2-12 (the Phase 1A RI SAP specified a frequency of 1 per day per sampling team for equipment rinsate blanks). However, in the Phase 1A RI SAP WS#12, Table 12-1, footnote 'a' states that "Analytically certified, organic-free water (or equivalent) will be used for organic parameters. Deionized or distilled water will be used for inorganic parameters.", and footnote 'b' states that "One source water blank will be collected for each source of water (distilled or deionized) used to decontaminate the soil and groundwater equipment and collect rinsate blank samples. The source-water blank sample will verify that the water used for decontamination was analyte free." ERM used the same water for both organic and inorganic sample fractions and could not confirm that the deionized water being used was organic-free water or equivalent.

On February 18, 2014, PWT observed ERM decontaminate the decaport splitter used during surface water sampling and collect an equipment rinse blank. The splitter was the only non-disposable piece of water sampling equipment used during the Phase 1A activities. Prior to collecting the rinse blank, 10 new polyethylene tubing strips were installed on the splitter. Deionized water was poured into the top of the splitter and 10 bottles were filled simultaneously. Sample fractions for all analyses were collected except for VOCs, dissolved metals, and CN. Perchlorate and hexavalent chromium sample fractions were not field filtered.

Prior to initiating drilling and between each boring, all down-hole drilling and sampling equipment was decontaminated by thoroughly washing with a pressure-washer using cold tap water, which was not in accordance with the equipment decontamination SOP USM-03, *Equipment Decontamination*. SOP USM-03 states that down-hole metal drilling equipment will be steam cleaned with high-pressure hot tap water. The decontamination took place at the sample location and the decontamination fluid was allowed to infiltrate into the ground. Note SOP USM-10, *Monitoring Well Installation and Development*, states drilling and sampling equipment decontamination fluid will be contained which is inconsistent with SOP USM-03, *Equipment Decontamination,* which states it will not be contained.

2.3.10 Management of Investigation-Derived Waste

Investigation-derived waste (IDW), both solids and liquid, was generated during the Phase 1A activities. IDW was handled in accordance with Section 14.5.3 of the Phase 1A RI SAP and applicable SOPs (as modified by Record of UFPQAPP-SAP Modification 14C-2-6). IDW was handled as follows:

- Used personal protective equipment (PPE) was disposed of in dumpsters at the US Magnesium facility;
- Excess soil from surface soil sample collection was left at the sampling location;
- Excess soil from subsurface borings and soil cuttings from monitoring well installation was placed in an enclosed roll-off bin and stored at the Site;
- Decontamination water was temporarily containerized in 5-gallon buckets and transferred to the Central Ditch (except for drilling IDW as noted above);
- Development water and purge water from monitoring wells was temporarily containerized and transferred to the Central Ditch.

The IDW water was poured into a catch basin located beneath the powder bins that drains to the Central Ditch (Photo 18, Appendix C).

2.3.11 Field Documentation and Reporting

In accordance with WS#14 of the Phase 1A RI SAP and SOP USM-06, *Field Documentation*, ERM used field data sheets and log books to document field activities such as sample locations, field observations, monitoring results, and significant events that occur during field activities. ERM provided daily progress reports at the end of each field day in accordance with WS#33. ERM also provided electronic copies of field logs, notes, and other field documentation to the EPA on a weekly basis during investigation activities and monthly status reports at the end of each month in accordance with WS#14.

ERM collected sample location coordinates in the field using a Trimble Pro XH GPS. The GPS field data collection procedures appear to have been conducted in accordance with SOP USM-11, *Global Positioning System (GPS) Field Data Collection*.

2.4 HEALTH AND SAFETY CONSIDERATIONS

2.4.1 General Health and Safety Approach

Health and safety considerations were taken into account at each sampling location and PRI-specific details are described in the sections below. The Field Team held tailgate health and safety meetings at the start of each new task. PPE was worn at all sampling locations in accordance with the appropriate health and safety plans for each contractor. The minimum level of PPE donned was modified Level D and was frequently upgraded to Level C. All PWT site work was conducted in general accordance with PWT's and US Magnesium's respiratory protection programs.

For health and safety considerations, PWT field personnel did not enter the surface water and kept a safe distance from low pH wastewater. Observations of surface water sampling were made from the nearest and best observation point rather than accompany ERM at the sample collection point.

Throughout the Phase 1A RI field activities, PWT field personnel conducted ambient air monitoring for VOCs, dust, chlorine gas, and hydrogen chloride (HCl) gas using direct-reading real-time instrument. PWT used an Industrial Scientific iBRiD MX6 multi-gas meter with a PID and oxygen, carbon monoxide, HCl, and chlorine gas sensors and a DustTRACK2 monitor. The dust monitor was only used between November 19 and December 11, 2013, before winter precipitation and snow mitigated the dust hazards. The ERM field personnel donned personal chlorine gas detectors which seemed more sensitive and often measured higher chlorine gas concentrations than the PWT multi-gas meter. Respiratory protection was upgraded as necessary depending on the presence of chlorine gas in the ambient air.

2.4.2 Health and Safety Issues Encountered

Weather conditions and facility process operations can significantly influence the potential for chlorine gas and other air borne contaminants to accumulate in the ambient air.

During the Phase 1A RI field activities, chlorine gas was measured with field instruments in ambient air at concentrations up to 5 parts per million (ppm) and HCl gas was measured at concentrations up to 2 ppm. Elevated VOCs were not detected with the PID which measured VOCs in the ppm range. Respiratory protection was donned regularly due to the presence of chlorine gas. The highest chlorine gas concentrations were encountered on the afternoon of February 6, 2014, when concentrations were sustained near 5 ppm while attempting to sample groundwater wells in the vicinity of the ditches. The response actions listed in ERM and PWT Health and Safety Plans (HASPs) were followed. When the Field Team arrived at monitoring well MW-6, chlorine gas was around 5 ppm so the Field Team left the area and returned 30 minutes later to the same conditions. The Field Team again left the area and returned later to access PZ-24 and the same conditions were encountered so the Field Team left the area and wells MW-6 and PZ-24 were not sampled that day. The Field Team returned the next day, February 7, 2014, to sample the wells and chlorine gas was not detected. On February 6, 2014, the air was relatively still and there appeared to be additional discharge of chlorine gas from the outfall pipe at the confluence of the Chlorine and Main Ditches (Photo 19, Appendix C). Note that ERM's

HASP has a maximum sustained chlorine gas action level of 5 ppm and PWT's action level is 2 ppm; thus ERM could continue to work at levels between 2-4.9 ppm; however, PWT's HASP directs PWT to not work at levels greater than 2 ppm.

On May 6, 2014, at 12:26 p.m., a PWT field team member was entering the US Magnesium facility, going from car to guard shack to sign in, and their eyes began to burn immediately upon exiting the vehicle. There was a faint odor that did not appear to be chlorine; the multi-gas meter did not alarm. There was a strong north wind at the time and the guard shack was directly downwind from the main facility operations. ERM field personnel in the vicinity experienced the same initial reaction, but not the lingering effects as the PWT person. The PWT person flushed their eyes with saline eye drops, which was painful and did not seem to improve the condition and experienced a numb feeling in their eyes and headache. Per PWT's discussion with Roger Francom of US Magnesium on May 7, 2014, US Magnesium was applying an epoxy coating to the concrete floors in the facility. When the epoxy fumes mix with the chlorine and HCl in the air, "tear gas" is created. There was no prior knowledge by PWT of US Magnesium's maintenance activity to place epoxy coating on concrete, or the emissions that are created during this activity. No training specifically related to these air emissions was prepared or available because PWT had no prior knowledge of the epoxy coating work, the related potential health hazards, the chemical emissions, where the work was being conducted, when the work was being conducted, etc. Since the time of the incident, Material Safety Data Sheets have been obtained for the epoxy material that was being used. The PWT person experienced symptoms (aching and dryness) with the chemical burn to their eyes for over a month following the exposure incident.

During the Phase 1A field activities, fugitive dust was not visible and the dust monitor did not detect significant levels of particulates in the air. However, dust was often generated while driving on dirt roads in and around the facility. The dirt roads in PRI Areas 15 and 16 in particular become very dusty in the dry months and it is a very fine dust. Recreational visitors, hunters, and ranchers were observed traversing these roads. PWT field vehicle windows were kept closed while driving to mitigate the dust inhalation hazard.

Field work was conducted in variable weather conditions with temperatures below 0 degrees Fahrenheit at times. The extremely cold weather created frost bite concerns for fingers when ERM staff was processing samples and for toes as a result of the steel-toe boots. Still air created air quality concerns because the chlorine gas would settle around the facility and low lying clouds limited the Field Team's ability to see the white haze of the chlorine gas plume and monitor the location of the stack plume. There was significant snow fall at times which created driving hazards and slip/trip/fall hazards mainly due to walking on uneven surfaces covered with snow. This was of particular concern when traversing through areas that had the potential for sink holes. Thunderstorms with lightning were also a concern. On May 6, 2014, drilling was postponed due to lightning storm.

PRI-specific health and safety issues are discussed in the sections below.

2.5 SPECIFIC FIELD OBSERVATIONS AT EACH PRI

Field activities were conducted in PRI Areas 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17. The PWT PRI area-specific observations for the field activities during the Phase 1A RI are

reported below. Surface water activities are reported with the PRI, and all groundwater activities are reported as part of PRI Area 17, Site-Wide Water. Some surface water samples were associated with a collocated solid sample. PWT field notes and field data sheets are provided in Appendices A and B, respectively, and a photographic log is provided in Appendix C. The following sections summarize observations of the Phase 1A RI field activities with sampling summaries and observations provided separately for solid and aqueous media.

Table 1 details information regarding each sample and split sample collected; including location identification, media, number of samples, rationale, split sample number and date of sample collection. Table 2 provides the tally and percent calculations for the split and QC samples obtained by PWT.

Figure 1 provides a general site location and features map, including identification of the PRI areas and US Magnesium facility features. Figures 2 through 5 show the locations of the split samples accepted by EPA/PWT: Figure 2 – Surface Solids; Figure 3 – Subsurface Solids; Figure 4 – Surface Water; and Figure 5 – Groundwater.

2.5.1 PRI Area 2 – Landfill

2.5.1.1 Site Description and Sampling Requirement

PRI Area 2, the landfill, is a waste disposal area that receives solid and other unidentified waste from the facility. The landfill disposal area includes east of the Chlorine Ditch, south of the Main Ditch, west of the Southwest Ponded Waste Lagoon, and north of the Star Pond. A 6-inch gypsum cover is applied to the exposed working face of the landfill twice monthly (ERM 2014). Based on the height of the top of the landfill relative to the surrounding natural ground level, the expected thickness of disposed waste is estimated to be 20 to 25 feet. PRI Area 2 consists of the raised portion of the landfill and the ground level area to the south.

The Phase 1A RI SAP identified the performance of a geophysical survey and collection of 14 surface solids samples and three collocated subsurface solids samples. The geophysical survey oversight activities are summarized in the *Landfill Geophysical Survey Field Oversight Report* (EPA 2014). The subsurface sampling requirement was to advance a boring into the native material below the landfill to evaluate contamination at depth. The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI2-003 and PRI2-010), and 1 split sample from each of the three subsurface solids sample locations (PRI2-006, PRI2-009, and PRI2-014). The three subsurface solids sample locations were collocated with surface solids samples. All of the split sample locations were in the raised portion of the landfill.

2.5.1.2 Sampling Dates

The surface solids sample locations that did not have collocated subsurface solids samples were collected on January 8 and 9, 2014. The geophysical survey was conducted on March 5 and 6, 2014, and the borehole drilling and subsurface solids sampling was conducted on May 6 and 7, 2014. The collocated surface solids samples at locations PRI2-006, PRI2-009, and PRI2-014 were collected on May 8, 2014.

2.5.1.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of all surface solids samples in PRI Area 2 and accept two split samples (PRI2-03-SS01-010814-ES01 and PRI2-10-SS01-010814-ES01). Split surface solid split sample PRI2-03-SS01-010814-ES01 was collected from a flat, graded area in the western area of the landfill. Split surface solids split sample PRI2-10-SS01-010814-ES01 was collected from a flat, graded area in the northeastern area of the landfill. All surface solids samples were collected at the locations proposed in the Phase 1A RI SAP. All sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 6 inches from five grab sample aliquots using a hand auger, with the exception of location PRI2-003 which required one additional aliquot to accommodate for the split sample. ERM submitted Field Modification Approval Form 14C-1-15 for the additional aliquot and it was signed in the field by the PWT field representative on January 8, 2014.

There is very little vegetation or rocky material in PRI Area 2 and recoveries were generally around 99 percent. The surface solids samples collected from the raised surface of the landfill appeared to be cap materials and most did not penetrate into the landfill waste. Significant evidence of landfill waste (trash) and non-cap material was only detected at 3 surface sample locations (PRI2-004, PRI2-005, and PRI2-010). What appeared to be black smut was observed in many of the samples, particularly on the east side of the landfill. The surface solids sample from location PRI2-002, on the ground level in the southwest area of PRI Area 2, had approximately 0.5 inches of brown silty sand on the surface and from about 0.5 inches to 6 inches was what appeared to be black smut with white specks (Photo 20, Appendix C). The surface solids sample from location PRI2-001 was collected from clean imported fill material that appeared to have been recently laid down and graded, as there were large stockpiles of the same material nearby. The surface solids sample from location PRI2-002 was located in a heavily traveled area and surface soil was very disturbed. The surface solids sample from location PRI2-007, located on ground level area of the landfill, was collected from the top of a soil stockpile. The samples were generally easily worked through a ¼-inch sieve with approximately 95 to 98 percent of material passing through the sieve.

2.5.1.4 Borehole Drilling and Subsurface Solids Sample Collection

Ms. Catherine LeCours (PWT) was on site the week of May 5, 2014, to oversee the borehole drilling and collection of all subsurface solids samples in PRI Area 2. Each of the three boring locations from the Phase 1A RI SAP was adjusted based on the review of the geophysical survey results and recommendations from EPA. ERM prepared Field Modification Approval Form 14C-1-21 for the boring location adjustments and EPA approved it on May 12, 2014. PWT accepted one split sample from each of the borings. PWT oversaw all borehole drilling and reviewed ERM's boring logs in the field. All subsurface solids sampling was conducted in general accordance with SOP USM-09, *Subsurface Soil, Sediment, and Waste Sampling*.

ERM contracted Boart Longyear to provide the necessary equipment and personnel to drill the borings. The soil borings were advanced using a truck-mounted, Roto Sonic drilling rig. Sonic drilling employs the use of high-frequency, resonant energy to advance a core barrel or casing into the subsurface; no air, mud, or water is used in the coring process. During drilling, each

borehole was continuously cored for logging of subsurface lithology. The core barrel produced a continuous, relatively undisturbed core sample in a plastic liner. Core samples were extracted in 10- or 20-foot sections. After reaching total depth, each borehole was backfilled with dry 3/8-inch bentonite chips. Photographs of the core samples are provided in Appendix C.

As provided for in Record of UFPQAPP-SAP Modification 14C-2-21, some sample intervals were adjusted based on the characteristics of the materials encountered. Subsurface sampling details for the landfill borings in PRI Area 2 are discussed below.

Subsurface Solids Sampling at PRI2-006:

On May 6, 2014, the drill rig mobilized to boring location PRI2-006 and set up on the hole, but drilling was postponed due to a thunderstorm with lightning. ERM informed PWT they were not going to commence work that day and PWT field personnel left the Site for sample processing at the office trailer. However, the storm passed and the drillers returned to the location and drilled the PRI2-006 borehole to 20 feet below ground surface (bgs) and collected four subsurface solids samples. PWT was not notified of ERM's decision to proceed with the drilling. On the morning of May 7, 2014, ERM informed PWT that they had proceeded with the drilling of PRI2-006 borehole and recognized they should have notified PWT before proceeding; accordingly, ERM offered to core another borehole adjacent to the current borehole so PWT could observe the lithology. ERM completed the original boring and then moved over a few feet to re-drill the first 20 feet for PWT to observe. During the first and second step-out re-drill attempts, the drill rig hit refusal at approximately 10 feet and PWT was not able to view the lithology of the 10- to 20-foot interval.

The borehole at PRI2-006 was advanced to a depth of approximately 29 feet bgs. Following inspection of the core, ERM collected 8 samples.

- 0.5 to 2 feet bgs – PRI2-006-SB01-.5-050614
- 2 to 5 feet bgs – PRI2-006-SB02-2-050614
- 5 to 10 feet bgs – PRI2-006-SB03-5-050614
- 11 to 17 feet bgs – PRI2-006-SB04-11-050614
- 20 to 22 feet bgs – PRI2-006-SB05-20-050714
- 22 to 24 feet bgs – PRI2-006-SB06-22-050714
- 24 to 26 feet bgs – PRI2-006-SB07-24-050714
- 27 to 29 feet bgs – PRI2-006-SB08-27-050714

There was no recovery from 10 to 11 feet bgs due to encountering metal. Recovery from 17 to 20 feet bgs consisted of silty gravel and debris. ERM decided not to sample this interval due to the lack of fines. Recovery from 26 to 27 feet bgs was clayey gravel at the bottom of the landfill waste; therefore, no sample was collected. The native soil interface, observed to be clayey sand, was encountered at approximately 27 feet bgs. PWT accepted a split sample of what appeared to be smut from the 24 to 26 feet bgs sample interval (PRI2-06-SB07-24-050714-ES01).

Subsurface Solids Sampling at PRI2-009:

The borehole at PRI2-009 was advanced to a depth of approximately 30.5 feet bgs. Following inspection of the core, ERM collected 8 samples.

- 0.5 to 2 feet bgs – PRI2-009-SB01-.5-050614
- 10 to 12 feet bgs – PRI2-009-SB02-10-050614
- 12 to 14 feet bgs – PRI2-009-SB05-12-050614
- 14 to 18 feet bgs – PRI2-009-SB06-14-050614
- 18 to 20 feet bgs – PRI2-009-SB07-18-050614
- 21 to 23 feet bgs – PRI2-009-SB08-21-050614
- 26 to 28 feet bgs – PRI2-009-SB04-26-050614
- 28.5 to 30.5 feet bgs – PRI2-009-SB03-28.5-050614

There was wood, rubber, and metal debris in the 0.5 to 2 feet bgs sample. There was no recovery from 2 to 10 feet bgs due to an asphalt plug in the core barrel. Recovery from 23 to 26 feet bgs was mostly large pieces of wood; therefore, no sample was collected. The native soil interface, observed to be tight clay, was encountered at approximately 28.5 feet bgs. PWT accepted a split sample from the 28.5 to 30.5 feet bgs sample interval (PRI02-09-SB03-28.5-050614-ES01). PID readings ranging from 0.9 to 20 ppm were measured from the soil core.

Subsurface Solids Sampling at PRI2-014:

The borehole at PRI2-014 was advanced to a depth of approximately 35 feet bgs. Following inspection of the core, ERM collected 7 samples.

- 0.5 to 2 feet bgs – PRI2-014-SB01-.5-050714
- 3 to 10 feet bgs – PRI2-014-SB02-3-050714
- 10 to 20 feet bgs – PRI2-014-SB03-10-050714
- 22 to 27 feet bgs – PRI2-014-SB04-22-050714
- 27 to 30 feet bgs – PRI2-014-SB05-27-050714
- 30 to 31 feet bgs – PRI2-014-SB06-30-050714
- 31 to 33 feet bgs – PRI2-014-SB07-31-050714

Recovery from 10 to 20 feet bgs was salt and iron waste and the material was consistent throughout the entire interval, so a single sample was composited from 10 to 20 feet bgs. PWT accepted a split sample from the 10 to 20 feet bgs sample interval (PRI2-14-SB03-10-050714-ES01). There was no recovery from 20 to 22 feet bgs. The native soil interface, observed to be sandy clay, was encountered at approximately 31 feet bgs. The 33 to 35 feet bgs interval appeared to be the same native sandy clay included in the 31 to 33 feet bgs sample; therefore, no sample was collected.

2.5.1.5 Air Monitoring/Health and Safety Considerations

Due to the landfill's proximity to the Chlorine and Main Ditches, chlorine gas readings in the breathing zone were frequently elevated to and above screening levels of 0.5 ppm for chlorine gas. Depending on the strength and direction of the wind, chlorine gas readings from the Stack plume were also frequently encountered on the raised portion of the landfill. There is frequent heavy equipment and vehicle traffic in PRI Area 2 and they are often fast moving. The faces of the raised portion on the landfill are steep and some have exposed debris, making them challenging to traverse, and creating serious slip/trip/fall hazards.

2.5.1.6 General Observations

The grid sample locations appear to represent each of the different areas and different surface solids types within PRI Area 2, with the exception of the northeast corner of the PRI, which may be representative of the surface solids sampling in PRI Area 5. New facility construction is encroaching on the southwest perimeter of PRI Area 2. While on top of the southeast corner of the raised portion of the landfill, PWT noticed what appeared to be another waste disposal area southwest of the landfill, in PRI Area 5 (Photo 24, Appendix C). The area was defined by the rust colored material and debris at the surface. The landfill is routinely capped with gypsum (ERM 2014), but it appears that it may also be capped with smut and imported fill.

2.5.2 PRI Area 3 – Sanitary Lagoon

2.5.2.1 Site Description and Sampling Requirement

PRI Area 3, the Sanitary Lagoon, is a waste disposal area that receives sanitary waste from the US Magnesium plant. One surface water sample at location PRI3-003 was identified for collection from the Sanitary Lagoon, PRI Area 3, during the Phase 1A RI. On November 21, 2013, ERM and PWT searched the Sanitary Lagoon for the presence of surface water and no standing water was observed (Photo 25, Appendix C); therefore, surface water sample PRI3-003 was not collected.

2.5.3 PRI Area 4 – Gypsum Pile

2.5.3.1 Site Description and Sampling Requirement

PRI Area 4, the Gypsum Pile, is where calcium sulfate (removed from the concentrated brine with calcium chloride) is transported and disposed of via a slurry line. The gypsum slurry discharge pipe is located on the south side of the gypsum pile and is moved frequently to spread out the gypsum on the pile. The gypsum slurry is not continuously flowing, but when it is, the slurried wastes released to the Gypsum Pile create surface water that flows into the waste pond in PRI Area 6.

The Phase 1A RI SAP identified collection of two surface water samples at locations PRI4-008 and PRI4-013. The sample from location PRI4-013 was to be collected from the outlet of the gypsum slurry discharge pipe and the sample from location PRI4-008 was to be collected from gypsum slurry surface water where it flowed into the waste pond in PRI Area 6 (Photo 26,

Appendix C). The Phase 1A OS QAPP identified split samples from one of the two surface water sample locations (PRI4-013).

2.5.3.2 Sampling Dates

The surface water sample from location PRI4-013 was collected on November 25, 2013, and from location PRI4-008 on November 26, 2013.

2.5.3.3 Surface Water Sample Collection

PWT was on site to oversee the collection of both surface water samples in PRI Area 4 (PRI4-008 and PRI4-013) and accept a split sample (PRI4-13-SW01-112513-ES01) from PRI4-013. Water sampling was conducted in general accordance with SOP USM-08, *Surface Water Sampling*. The surface water sample from location PRI4-013 was collected from the gypsum slurry discharge at the time it was actively flowing. At sample location PRI4-013, ERM attempted to collect the sample using the peristaltic pump method but there was too much sediment in the water and the peristaltic pump clogged. ERM determined that using a pole-mounted dipper would be a more appropriate sampling method than the tubing/peristaltic pump method described in SOP USM-08, *Surface Water Sampling*. Therefore, ERM submitted Field Modification Approval Form 14C-1-3 for surface water sample PRI4-013 collected using a pole-mounted dipper (Photo 27, Appendix C). Bottles which do not require filtration were filled directly from the dipper. Note that this sampling method is consistent with Phase 1A RI SAP WS#11, Section 11.2.2, Step 7, Surface Water, Sampling and Analysis Methods. VOC sample bottles were filled first directly from the dipper (Photo 28, Appendix C). VOC samples were effervescing. The sample splitter was used for all non-VOC analyte split sample fractions. There was a significant amount of sand and sediment in the scoops from the dipper. For sample fractions requiring filtration, ERM filled a 5-gallon bucket using the dipper and allowed the water to settle to the extent possible, then used the peristaltic pump to pump the water from the bucket through an in-line filter, but the filters immediately clogged; therefore, ERM was unable to field filter samples. ERM decided to use unpreserved bottles for the dissolved metals fraction and PWT did the same; CN fractions were still preserved.

Water sampling at location PRI4-008 was performed using a peristaltic pump with new ⅝-inch Tygon tubing with the pump and new ½-inch polyethylene tubing to convey the water to and from the pump. The water intake side of the tubing was attached with zip ties to a PVC pipe and placed at the mid-point of the water column, approximately. PWT had difficulty accessing the sample location due to the muddy conditions and observed sampling from a distance.

2.5.3.4 Air Monitoring/Health and Safety Considerations

While driving to the top of the gypsum pile on November 25, 2013, a strong chlorine gas odor was noticed from inside the field vehicles, so the Field Team donned respirators before exiting the vehicles. Upon exiting the vehicles the air meter was reading 0 ppm for chlorine and 0.3 ppm for HCl. Shortly after, chlorine increased to 0.1 ppm and HCl increased to 1.1 ppm. The Field Team was in Level C PPE with full-face respirators during the entire time while collecting the surface water sample at location PRI4-013. No elevated chlorine gas readings were recorded in

PRI Area 4 on November 26, 2013; however, during sampling preparation at the ERM field trailer, sustained HCl reading ranging from 0.6 ppm to 1.2 ppm were detected.

2.5.3.5 General Observations

In areas where the gypsum slurry has been recently flowing out onto the pile, the gypsum mud can get up to one foot deep and is nearly impossible to cross on foot. The gypsum flows into the smut piles; there is no boundary between the two waste areas (Photo 29, Appendix C).

2.5.4 PRI Area 7 – Northeast Ponded Waste Lagoon

2.5.4.1 Site Description and Sampling Requirement

PRI Area 7, the Northeast Ponded Waste Lagoon, received wastewaters from the US Magnesium facility via the Main Ditch from 1972 through 1986. It is the largest impoundment at the Site, encompassing approximately 834 acres. US Magnesium considers this area an inactive waste lagoon; however, the western shoreline-berm is repeatedly breached, and wastewater from the active lagoons is discharged into this "inactive" waste lagoon. Along the western shoreline, there are continuously flowing seeps that emanate from the adjacent, up-gradient, active waste lagoons.

The Phase 1A RI SAP identified collection of six surface water samples from the flowing seeps along the western shoreline of PRI Area 7 (locations PRI7-001, PRI7-003, PRI7-007, PRI7-009, PRI7-013, and PRI7-014). The Phase 1A OS QAPP identified split samples from two of the six surface water sample locations (PRI7-007 and PRI7-013).

2.5.4.2 Sampling Dates

The surface water samples were collected on November 20, 21, and 22, 2013.

2.5.4.3 Surface Water Sample Collection

PWT was on site to oversee the collection of three of the six surface water samples in PRI Area 7 (PRI7-007, PRI7-013, and PRI7-014) and accept two split samples (PRI7-07-SW01-112113-ES01 and PRI7-13-SW01-112213-ES01). During the Phase 1A RI, there was no surface water or flowing seeps in the area of proposed surface water sample PRI7-009; therefore, no surface water sample was collected at that location. Surface water sample locations PRI7-003, PRI7-007, PRI7-013, and PRI7-014 were modified to coincide with seep locations (Record of UFPQAPP-SAP Modification 14C-2-9) (Photos 30, 31, and 32, Appendix C); all other surface water samples were collected at the locations proposed in the Phase 1A RI SAP. PWT did not observe surface water sample collection at locations PRI7-001 and PRI7-003 on November 20, 2013, because PWT was with the ERM soil sampling team in PRI Area 16. All sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. Water quality parameters were measured in situ following sample collection (Photo 33, Appendix C).

2.5.4.4 Air Monitoring/Health and Safety Considerations

No chlorine gas was detected above field action levels during the one day of field work conducted by PWT. Hazards during sampling included split/trip/fall hazards associated with walking on uneven or unstable ground and adjacent to open water in seeps.

2.5.4.5 General Observations

The sample locations appear to cover the majority of the flowing seeps along the western shoreline within PRI Area 7. All of the surface water samples were collected prior to the significant wastewater breach into PRI Area 7 that occurred during the Phase 1A RI (breach discussed in Section 2.3.4).

2.5.5 PRI Area 8 – Northwest Ponded Waste Lagoon Overflow

2.5.5.1 Site Description and Sampling Requirement

PRI Area 8, the Northwest Ponded Waste Lagoon Overflow, is located in an area to the north of the facility with relatively flat surface topography that periodically receives leakage or discharge from the Northwest Ponded Waste Lagoon (PRI Area 6) to the south (Figure 1). PRI Area 8 is separated from PRI Area 6 by a flat-topped berm with dirt roadway. Wastewater seeps emanating from the PRI Area 6 active waste lagoon are present along the length of the shoreline berm. Beginning in December 2013, there was a significant breach in the shoreline-berm and large amounts of wastewater from the active lagoon discharged into this overflow pond (breach discussed in Section 2.3.5).

The Phase 1A RI SAP identified collection of 17 surface solids samples (locations PRI8-001 through PRI8-017, 1 subsurface solids sample at location PRI8-017, and 1 surface water sample at location PRI8-005. The Phase 1A OS QAPP identified split samples from 3 of the 17 surface solids sample locations (PRI8-001, PRI8-005, and PRI8-015), and from the subsurface solids sample location (PRI8-017). Due to the inundation of wastewater into PRI Area 8, the EPA required the collection of two additional surface solids samples and four additional surface water samples. The surface water samples are formally considered as part of PRI Area 17, Site-Wide Water, but field observations are discussed here.

2.5.5.2 Revisions to the Proposed Sample Locations

The Phase 1A RI SAP location for subsurface solids sampling at PRI8-017 was modified due to safe access limitations caused by the low pH surface water and sinkholes. The subsurface solids sample location was moved to be on top of the bermed road that separates PRI Area 8 from PRI Area 6. ERM submitted Record of UFPQAPP-SAP Modification 14C-2-9 for the sample location change and it was approved by EPA on October 29, 2013.

On December 19, 2013, ERM determined that surface solids samples from locations PRI8-005, PRI8-006, PRI8-010, PRI8-014, PRI8-015, and PRI8-017 could not be safely accessed due to the presence of low pH surface water. Due to the presence of wastewater and ERM's health and safety concerns about collecting the remaining surface solids samples in PRI Area 8, EPA issued Record of UFPQAPP-SAP Modification 14C-2-18 dated October 29, 2013, requesting four

additional surface water samples (PRI8-018, PRI8-019, PRI8-020, and PRI8-021) to reflect the conditions that were present in PRI Area 8 following the release of wastewater from PRI Area 6. The Record of UFPQAPP-SAP Modification 14C-2-18 also stated that until April 15, 2014, ERM should continue to monitor the accessibility of the original sampling location and, if necessary, after April 15 outline the procedure to be employed for obtaining the remaining surface solids samples as identified in the Phase 1A RI SAP.

The surface water sample at the Phase 1A RI SAP location for collocated surface solids and surface water sample PRI8-005 was collected on November 25, 2013. However, the solids sample was not collected at this time, even though the water was not too deep and the pH of the water was neutral. Following the collection of surface water sample at location PRI8-005 there was wastewater release into the area and the location became inaccessible. Pursuant to Record of UFPQAPP-SAP Modification 14C-2-18, an alternate procedure was identified for obtaining surface solids sample from location PRI8-005; however, the change in location was not optimal because the water and sediment samples would not strictly be collocated as desired based on the Phase 1A RI SAP. The EPA requested two samples be collected in place of the original PRI8-005 sample location: one sample location (PRI8-005A) was southwest of the Phase 1A RI SAP location at the edge of the standing water and a second sample location (PRI8-005B) would be at the edge of the "high water mark" from the January 2014 flooding event in PRI Area 8. On May 7, 2014, PWT and ERM identified and agreed upon the proposed sample locations for PRI8-005A and PRI8-005B. ERM submitted Field Modification Approval Form 14C-1-20 which was approved by EPA on May 12, 2014.

2.5.5.3 Sampling Dates

The surface solids samples from locations PRI8-001, PRI8-002, PRI8-003, PRI8-004, PRI8-007, PRI8-008, PRI8-009, PRI8-011, PRI8-012, PRI8-013, and PRI8-016 were collected on December 17, 18, and 19, 2013. The surface solids samples from locations PRI8-010, PRI8-014, PRI8-015, and PRI8-017, which could not be accessed in December 2013, due to the presence of low pH surface water, were collected on March 25 and 26, 2014. Subsurface solids sampling at location PRI8-017 was conducted on December 16, 2013. The surface water sample from location PRI8-005 was collected on November 25, 2013, the surface water samples from locations PRI8-020 and PRI8-021 were collected on February 11, 2014, and the surface water sample from location PRI8-018 and PRI8-019 were collected on February 12, 2014. The surface solids samples from locations PRI8-005A and PRI8-005B were collected on May 8, 2014.

2.5.5.4 Surface Solids Sample Collection

PWT was on site to oversee the collection of all surface solids samples in PRI Area 8 and accept four split samples (PRI8-01-SS01-121713-ES01, PRI8-05B-SS01-050814-ES01, PRI8-15-SS01-032514-ES01, and PRI8-16-SS01-121913-ES01). All solids samples were collected at the locations proposed in the Phase 1A RI SAP with the exception of PRI8-005 and PRI8-017 as noted above. All sampling was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 6 inches from 5 grab sample aliquots using a hand auger. The presence of vegetation or rocky material did not impact sample location or recoveries, which were generally around 100 percent. The samples were generally easily worked through a ¼-inch sieve with approximately 90 to 99 percent of material

passing through the sieve. The surface soil observed in PRI Area 8 was predominantly silt with varying portions of sand and clay. Iron, rust colored, modeling was observed at or just under the surface at locations PRI8-003 and PRI8-009, and in many other areas around the perimeter of wastewater impact in PRI Area 8 (Photo 34, Appendix C). This iron staining appears to be indicative of wastewater impact in which the low pH water causes iron precipitation as the acidic water is neutralized by the surrounding carbonaceous oolitic sands (Photo 35, Appendix C). The surface solids samples from locations PRI8-005A, PRI8-005B, PRI8-006, PRI8-010, PRI8-014, PRI8-015, and PRI8-017 were collected following the receding of the inundation of wastewater. The soil at some of these locations was saturated so VOC sample fractions were collected. PWT agreed with ERM's interpretation of what should be considered saturated and thus when to collect VOC sample fractions.

The samples from locations PRI8-005A and PRI8-005B were collected from the southwest corner of the ponded water in the "angel wing" in accordance with Field Modification Approval Form 14C-1-20. The surface solids sample from location PRI8-005A was collected right at the shoreline, approximately 2 feet from the ponded water, and PRI8-005B was collected near the perimeter of wastewater impact. The Phase 1A RI SAP location for sample PRI8-005 is approximately 150 feet northeast of the PRI8-005A location (Photo 36, Appendix C). Soil was saturated at the PRI8-005A location so VOC samples were collected. Water filled into the PRI8-005A auger holes at depths ranging from 0 to 1.5 inches bgs.

2.5.5.5 Borehole Drilling and Subsurface Solids Sample Collection

On December 15, 2013, PWT was on site to oversee the advancement of the boreholes and collection of all subsurface solids samples at location PRI8-017. PWT accepted one subsurface solids split sample from location PRI8-017 which consisted of sample fractions from all 3 sampling intervals (PRI8-17-SB01-6-121613-ES01, PRI8-17-SB02-8-121613-ES01, and PRI8-17-SB03-10-121613-ES01). Sample location PRI8-017 is located on the north side of the bermed road that separates PRI Area 6 from PRI Area 8. ERM contracted Direct Push Services to provide the necessary equipment and personnel to advance the borings. The soil borings were advanced using a track-mounted direct-push rig (Geoprobe 7730DT). During the advancement of the borehole, the borehole was continuously cored in a 1.5-inch PVC liner for logging of subsurface lithology. Core samples were extracted in 5-foot sections (Photo 37, Appendix C). Soil from the core sample was used for classification according to ERM's Soil Logging Procedure. PWT reviewed ERM's boring logs in the field and generally concurred with the lithology descriptions.

Three boreholes were advanced at sample location PRI8-017. The first core was advanced to a depth of approximately 13 feet bgs. Native soil and saturation was encountered at a depth of approximately 6 feet bgs, which is at ground surface level at the imported fill and native soil interface. Following inspection of the first core, ERM decided to set the three 2-foot sample intervals at 6 to 8 feet bgs, 8 to 10 feet bgs, and 10 to 12 feet bgs. The second and third boreholes were advanced to a depth of approximately 12.5 feet bgs. The boreholes were advanced in a triangle pattern about 6- to 8-inches apart. There was not enough sample volume to fill all of the split sample containers from one sample interval; therefore, the split sample was divided between all of the sample intervals. The sample distribution for the split sample was as follows:

- PRI8-17-SB01-6-121613-ES01: VOCs, Semi-volatile organic compounds (SVOC), Polynuclear aromatic hydrocarbons (PAH), and perchlorate
- PRI8-17-SB02-8-121613-ES01: pH
- PRI8-17-SB03-10-121613-ES01: PCBs, PCDD/PCDF, metals, TOC

En Core® Samplers for VOCs analysis were collected from the first encountered clay at approximately 8 feet bgs (Photo 38, Appendix C). The saturated solid material from the 10- to 12-foot interval had standing water in the steel tray after homogenization and the mixture was off-gassing (bubbling).

All subsurface solids sampling was conducted in general accordance with SOP USM-09, *Subsurface Soil, Sediment, and Waste Sampling*, with the following exceptions: (1) the complete ERM Subsurface Clearance Process (Section 6.2, Item 1) was not conducted (no hand augering); and (2) PID screening was not performed (Section 6.3.1, Items 8-11). After reaching total depth, each borehole was backfilled with bentonite chips and hydrated after placement. PWT did not witness the decontamination of the drilling equipment before or after the advancement of the boreholes at this location.

2.5.5.6 Surface Water Sample Collection

PWT was on site to oversee the collection of all 5 surface water samples in PRI Area 8 (locations PRI8-005, PRI8-018, PRI8-019, PRI8-020, and PRI8-021) and accept surface water split samples from 2 of the 5 locations (PRI8-18-SW01-021214-ES01 and PRI8-19-SW01-021214-ES01). The Phase 1A RI SAP proposed only one surface water sample location, PRI8-005, because that was the only location in PRI Area 8 at the time that had standing surface water. The surface water sample from location PRI8-008 was collected on November 25, 2013, just prior to the infiltration of wastewater that occurred during the Phase 1A RI in that area. As a result of the wastewater intrusion, the EPA issued Record of UFPQAPP-SAP Modification 14C-2-18 which requested four additional surface water samples (PRI8-018, PRI8-019, PRI8-020, and PRI8-021) to reflect the conditions that were present following the wastewater intrusion.

Surface water sampling was performed using a peristaltic pump with new ⅝-inch Tygon tubing at the pump and new ½-inch polyethylene tubing to convey the water to and from the pump. The water intake side of the tubing was attached with zip ties to a PVC pipe and placed at approximately the mid-point of the water column. The sample splitter was used to collect all non-VOC split sample fractions. Water sampling was conducted in general accordance with SOP USM-08, *Surface Water Sampling*. At sample locations in wastewater, due to health and safety concerns, the depth of the water column and depth of the sample tubing intake was estimated rather than physically measured as stated in SOP USM-08 (Section 6.2, Item 2).

The surface water sample from location PRI8-018 was collected from ponded wastewater on the north side of the road that separates PRI Area 6 from PRI Area 8, approximately 8 feet north of subsurface solids sample location PRI8-017 (Photo 39, Appendix C). Water was approximately 12 inches deep at the sample location and was within the main water body on the south side of PRI Area 8. The sample had a yellowish color, a pH of 0.70, and chlorine was measured at 0.08 milligrams per liter (mg/L).

The surface water sample from location PRI8-019 was collected from ponded wastewater on BLM property at the shoreline north of sample location PRI8-005 (Photo 40, Appendix C). Water was approximately 12 inches deep at the sample location and was within the main water body in the "angel wing" area of PRI Area 8. The sample had a yellowish color, a pH of 1.07, and chlorine was measured at 0.10 mg/L.

The surface water sample from location PRI8-020 was collected from ponded wastewater 87 feet west of surface solids sample location PRI8-011. Water was approximately 4 inches deep at the sample location. The sample had a lime/yellowish green color, a pH of 0.46, and chlorine was measured at 0.12 mg/L. The CN bottles turned rust colored when water mixed with NaOH preservative.

The surface water sample from location PRI8-021 was collected from ponded wastewater 680 feet west of surface solids sample location PRI8-010. Water was approximately 2 inches deep at the sample location. The sample had a lime/yellowish green color, a pH of 0.29, and chlorine was measured at 0.11 mg/L. The CN bottles turned rust colored when water mixed with NaOH preservative.

2.5.5.7 Air Monitoring/Health and Safety Considerations

On February 12, 2014, while walking on the north side of the "angel wing" following sample collection at location PRI8-019, PWT field personnel were directly downwind of the facility stack and chlorine gas readings were sustained at 0.2 ppm. PWT personnel donned a full-face respirator until they were able to move out of the area. This was the only time that respiratory protection was required for chlorine gas in PRI Area 8 during the sampling events. Hazards during sampling included walking through wastewater-saturated soil, sink holes, and splashing of low pH water. On March 25, 2014, while driving around the north side of the "angel wing" on a temporary dirt road along the perimeter of wastewater impact, the weight of the ERM and PWT field vehicles caused the road to cave in (Photo 41, Appendix C). Upon further inspection, the entire width of the road was undermined from wastewater erosion.

2.5.5.8 General Observations

The grid sample locations appear to represent each of the different areas and different surface solids types within PRI Area 8. Cattle and antelope were observed grazing in PRI Area 8.

2.5.6 PRI Area 9 – Smut Area

2.5.6.1 Site Description and Sampling Requirement

PRI Area 9, the Smut Area, is where the "smut" (magnesium oxide and other salts) that settles to the bottoms of the melt and electrolytic cell is disposed of. The southern portion of the smut area is an "older" disposal area where waste is more weathered. The Phase 1A RI SAP identified collection of 14 surface solids samples (locations PRI9-001 through PRI9-014) from PRI Area 9. The Phase 1A OS QAPP identified split samples from 3 of the 14 surface solids sample locations (PRI9-002, PRI9-011, and PRI9-014). A higher percentage (20 percent) of split samples was required for PRI Area 9 (EPA 2013b). In addition, an EPA field duplicate sample was identified at sample location PRI9-011.

2.5.6.2 Sampling Dates

The surface solids samples from locations PRI9-012, PRI9-013, and PRI9-014 were collected on December 20, 2013. The remainder of the surface solids samples in PRI Area 9 were collected on January 6 and 7, 2014.

2.5.6.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of all surface solids samples in PRI Area 9 and accept three surface solids split samples (PRI9-02-SS01-010614-ES01, PRI9-11-SS01-010614-ES01, and PRI9-14-SS01-122013-ES01) and one split sample field duplicate (PRI9-11-SS01-010614-ES02). All solids samples were collected at the locations proposed in the Phase 1A RI SAP. All sampling was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. Samples were collected from 0 to 6 inches from 5 grab sample aliquots using a hand auger, with the exception of locations PRI9-002, PRI9-011, PRI9-013, and PRI9-014 which required additional aliquots (Photo 42, Appendix C) to accommodate for the split sample and the ERM and PWT field duplicate samples. ERM completed Field Modification Approval Forms 14C-1-13 and 14C-1-14 for the additional sample aliquots. With the exception of some firm salt nodules at some of the sample locations, samples were worked through a ¼-inch sieve with approximately 95 to 99 percent of material passing through the sieve. With the exception of samples from locations PRI9-007 and PRI9-012, which were primarily native soil (Photo 43, Appendix C), all of the solids samples in PRI Area 8 were smut with varying portions of black and white to gray smut (Photo 44, Appendix C).

2.5.6.4 Air Monitoring/Health and Safety Considerations

Because of the proximity of the Smut Area to the Ditches, facility operations and weather conditions need to be considered before conducting activities in the Smut Area. On December 20, 2013, while collecting the samples at locations PRI9-013 and PRI9-014, which are located in the smut area between the ditches to the north of the facility, chlorine gas was measured at up to 0.2 ppm and the Field Team donned respirators for the duration of the sampling in this area. On January 7, 2014, while collecting the sample from location PRI9-009, chlorine gas was measured at 0.1 ppm and there was visible white haze in the area, again the Field Team donned respirators for the duration of the sampling in this area. Access was difficult is some areas and footing hazardous getting over the steep face near the road and traversing the waste because of the loose and uneven nature of the waste piles (Photo 45, Appendix C). There are split/trip/fall hazards associated with the uneven surfaces, random debris, and the potential to sink into the waste.

2.5.6.5 General Observations

The grid sample locations appear to represent each of the different areas and different surface solids types within PRI Area 9. However, there are several types of smut present in the waste area that are now being segregated by the facility and no samples were collected from the new segregated smut piles. Older wastes are a mixture of different types of smut, a dark colored clayey waste which typically has higher moisture content, and a light colored white to gray salt-like waste. The smut piles extend north of the PRI Area 9 boundary, shown on Figure 14-9 of the Phase 1A RI SAP, and into PRI Area 15.

2.5.7 PRI Area 10 – Barium Sulfate Area

2.5.7.1 Site Description and Sampling Requirement

PRI Area 10, the Barium Sulfate Area, is situated north of the facility. Waste disposed of at the Barium Sulfate Area is cast-house residue from historical use of a barium-containing flux during casting. The Barium Sulfate Area is a permitted, closed repository where process material containing barium was treated and disposed of during the early 1990s. Engineered earthen disposal cells were constructed to contain waste material containing barium. The waste was flooded with brine (which contains high concentrations of sulfate) to immobilize any barium present by conversion to insoluble barium sulfate. After treatment, the cells were capped with 3 feet of clayey soil.

The Phase 1A RI SAP identified collection of 14 surface solids samples from PRI Area 10 (locations PRI10-001 through PRI10-014) and one subsurface solids sample location (PRI10-008). The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI10-003 and PRI10-013), and one split sample from the subsurface solids sample location (PRI10-008). In addition, one EPA field duplicate sample was identified for collection in PRI Area 10.

2.5.7.2 Sampling Dates

Surface solids sampling was conducted on December 12, 13, 16, and 17, 2013. Subsurface solids sampling was conducted on May 5, 2014. ERM attempted to access subsurface solids sample location PRI10-008 on December 17, 2013; however, surface soils were muddy and there was a high probability that the Geoprobe rig would get stuck, so the decision was made to postpone the sampling until the soil dried out and the samples were collected on May 5, 2014.

2.5.7.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of surface solids samples at locations PRI10-001 through PRI10-007, PRI10-009, and PRI10-013 and accept two split samples (PRI10-03-SS01-121213-ES01 and PRI10-13-SS01-121213-ES01) and one split sample field duplicate (PRI10-03-SS01-121213-ES02). Due to ERM operating with two field sampling teams, PWT did not witness the collection of surface solids samples from locations PRI10-008, PRI10-010, and PRI10-011 on December 17, 2013, or PRI10-012 and PRI10-014 on December 16, 2013. PWT did witness the homogenizing and the filling of sample containers for locations PRI10-012 and PRI10-014. All solids samples were collected at the locations proposed in the Phase 1A RI SAP with the exception of PRI10-010 which had to be moved to the north due to safe access limitations (sinkholes). All sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 6 inches from 5 grab sample aliquots using a hand auger, with the exception of location PRI10-003 which required 2 additional aliquots to accommodate for the split sample. ERM submitted Field Modification Approval Form 14C-1-12 for the additional aliquots and it was signed in the field by the PWT field representative on December 12, 2013. Sample recoveries were generally around 100 percent. The clayey soil in PRI Area 10 was generally difficult to work through a ¼-inch sieve but the percentage of material that passed through the sieve was

generally high, averaging approximately 99 percent. The surface soil observed in PRI Area 10 was predominantly clay with varying portions of sand and silt.

2.5.7.4 Borehole Drilling and Subsurface Solids Sample Collection

On May 5, 2014, Ms. Catherine LeCours (PWT) was on site to oversee the advancement of one borehole and collection of all subsurface solids samples at sample location PRI10-008. EPA/PWT collected one subsurface solids split sample from PRI10-008 which was collected from the 6- to 8-foot interval (PRI10-08-SB04-6-050514-ES01). Sample location PRI10-008 is located on the north central portion of the Barium Sulfate Area. ERM contracted Cascade Drilling to provide the necessary equipment and personnel to advance the boring. The soil borings were advanced using a track-mounted sonic drill rig. During the advancement of the borehole, the borehole was continuously cored with a 6-inch drill casing and 4-inch core barrel for continuous logging of subsurface lithology. The soil core was removed in 2- to 3-foot sections and placed in plastic bag sleeves. Photographs of the drilling process and core samples are provided in Appendix C. Soil from the core sample was used for classification according to ERM's Soil Logging Procedure. PWT reviewed ERM's boring logs in the field and generally concurred with the lithology descriptions.

The borehole at PRI10-008 was advanced to a depth of approximately 10 feet bgs. Groundwater was encountered at approximately 2.5 feet bgs and native soil was encountered at a depth of approximately 9 feet. Following inspection of the core, ERM collected 8 samples.

- 0.5 to 2 feet bgs – PRI10-008-SB01-.5-050514
- 2.0 to 4.0 feet bgs – PRI10-008-SB02-2-050514
- 4.0 to 6.0 feet bgs – PRI10-008-SB03-4-050514
- 6.0 to 7.5 feet bgs – PRI10-008-SB04-6-050514
- 8.0 to 9.0 feet bgs – PRI10-008-SB05-8-050514

The sample intervals were determined by trying to obtain 2-feet of the core per sample interval with consideration of significant changes in lithology. For example, the soil encountered from 8- to 9-feet appeared to be waste material and from 9- to 10-feet the soil appeared to be native clay, so the entire 8- to 10-foot interval was not homogenized and sampled because ERM chose to focus sampling on the waste material. About 40 percent of the soil from the 2- to 4-foot interval would not pass through the ¼ inch sieve.

No PID readings were detected during the screening of the core; however, the PID screening was performed after the plastic was cut open and left open for a short period. En Core® Samplers for VOCs analysis were driven into the bulk sample prior to sieving and homogenizing. Due to the softness of the sediment, the plunger bottom of the En Core® Sampler had to be pushed into the coring body by hand prior to pushing into the sediment (pre-engaged) and was driven by hand rather than being driven with an En Core® T-Handle as designed. Also, because the initial push into the sediment did not completely fill the coring body, the samplers had to be "topped off" and filled by hand.

Subsurface solids sampling was conducted in general accordance with SOP USM-09, *Subsurface Soil, Sediment, and Waste Sampling* with the following exceptions: (1) the complete ERM Subsurface Clearance Process (Section 6.2, Item 1) was not conducted (no hand augering); and (2) the borehole was abandoned with ⅜-inch bentonite chips, rather than ¼-inch bentonite chips and was not hydrated in place due to the presence of groundwater at about 2.5 feet bgs (Section 6.5). PWT did not witness the decontamination of the drilling equipment before or after the advancement of the boreholes at this location.

2.5.7.5 Air Monitoring/Health and Safety Considerations

No chlorine gas was detected above field action levels during the field work conducted in PRI Area 10. The surface cap over the barium sulfate, when moist, creates a very sticky mud, and when saturated, creates a very slippery mud; these conditions create slip/trip/fall hazards. Low pH surface water surrounds the barium sulfate disposal area.

2.5.7.6 General Observations

US Magnesium excavated native soil in the southwestern corner of PRI Area 10 to a depth of approximately 3 to 4 feet bgs and the soil was used to build up the road that separates PRI Area 6 from PRI Area 8. US Magnesium also excavated native soil on the west side of the barium sulfate area to a depth of approximately 1 to 2 feet bgs to build up the road that runs northwest through PRI Area 10 and northeast through PRI Area 8. Following excavation of the soil, wastewater filled the excavations. Following the wastewater breech into PRI Area 8 in December 2013, the barium sulfate area to the east of the road in PRI Area 10 became surrounded by wastewater and could only be accessed through a graded area in the southwest corner. The barium sulfate disposal area is raised, which prevented it from being submerged by the wastewater in PRI Area 8. On March 24, 2014, a Golden Eagle was observed perched on top of a soil stockpile in the southwestern corner of PRI Area 10.

2.5.8 PRI Area 11 – ATI Titanium Plant and US Magnesium Parking Lots

2.5.8.1 Site Description and Sampling Requirement

PRI Area 11, the ATI Titanium Plant and US Magnesium Parking Lots, is situated south-southwest of the US Magnesium facility and includes the ATI Titanium Plant property. The US Magnesium "Parking Lots" are flat graded dirt areas that are used for materials and equipment storage.

The Phase 1A RI SAP identified collection of 14 surface solids samples from PRI Area 11 (locations PRI11-001 through PRI11-014). The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI11-003 and PRI11-011).

2.5.8.2 Sampling Dates

Sampling was conducted on May 6 and 7, 2014.

2.5.8.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of all surface solids samples in PRI Area 11 and accept two split samples (PRI11-03-SS01-050614-ES01 and PRI11-11-SS01-050614-ES01). The surface solids sample from location PRI11-003 was collected from a flat US Magnesium equipment staging area where steel framing is currently being stored (Photo 51, Appendix C). The surface solids sample from location PRI11-011 was collected from disturbed soil in a greasewood shrub area south of the ATI Titanium Plant (Photo 52, Appendix C). All solids samples were collected at the locations proposed in the Phase 1A RI SAP. All sampling was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 2 inches from 5 grab sample aliquots using a flat-bottom scoop. Scoops collected a cake like portion of soil from a 4- by 6-inch area, 2 inches deep (Photo 53, Appendix C). Sample recoveries were generally around 100 percent. The samples were generally easily worked through a ¼-inch sieve with approximately 95 to 99 percent of material passing through the sieve.

All surface solids samples in PRI Area 11 appear to be composed of either disturbed native soil or imported road base material.

2.5.8.4 Air Monitoring/Health and Safety Considerations

No chlorine gas was detected above field action levels during the field work conducted in PRI Area 11. On May 6, 2014, the Field Team attended the ATI contractor safety orientation presentation.

2.5.8.5 General Observations

The grid sample locations appear to represent each of the different areas and different surface solids types within PRI Area 11; however, there are a few small areas of undisturbed native soil that were not sampled. On the large soil stockpile to the southwest of the ATI Titanium Plant near sample location PRI11-008, four antelope were observed lying down. Hundreds of sea gulls were observed bathing in ATI's surface water pond south of their plant. ATI personnel were present at all times during sample collection.

2.5.9 PRI Area 12 – Ancillary Worker Exposure Area

2.5.9.1 Site Description and Sampling Requirement

PRI Area 12, the Ancillary Worker Exposure Area, is situated southeast of the facility and includes the Hill Brothers property. It is a relatively flat area which includes the Hill Brothers chemical production facility, native salt-desert shrub areas, graded dirt roads, and a large salt stockpile area southeast of the Star Pond.

The Phase 1A RI SAP identified collection of 14 surface solids samples from PRI Area 12 (locations PRI12-001 through PRI12-014). The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI12-002 and PRI12-010).

2.5.9.2 Sampling Dates

Sampling was conducted on December 10, 11, and 12, 2013.

2.5.9.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of all surface solids samples in PRI Area 12 and accept two split samples (PRI12-02-SS01-121013-ES01 and PRI12-10-SS01-121013-ES01). The surface solids sample from location PRI12-002 was collected from sparsely vegetated, disturbed native soil area south of Hill Brothers and PRI12-010 was collected from salt pile area southeast of the Star Pond (Photos 54 and 55, Appendix C). The Phase 1A RI SAP sample location for PRI12-003 was in an asphalt-paved parking lot; therefore, the sample location was moved south to the nearest exposed soil (Record of UFPQAPP-SAP Modification 14C-2-9). All other samples were collected at the locations proposed in the Phase 1A RI SAP. Sampling was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 6 inches (see discussion of SAP deviation in Section 2.2) from five grab sample aliquots using a hand auger, with the exception of location PRI12-010 which required two additional aliquots to accommodate for the split sample. ERM submitted Field Modification Approval Form 14C-1-10 for the additional aliquots and it was signed by the PWT field representative on December 10, 2013. Sample recoveries were generally around 100 percent. The samples were generally easily worked through a ¼-inch sieve with approximately 95 to 99 percent of material passing through the sieve.

2.5.9.4 Air Monitoring/Health and Safety Considerations

No chlorine gas was detected above field action levels during the field work conducted in PRI Area 12.

2.5.9.5 General Observations

The grid sample locations appear to represent each of the different areas and different surface solids types within PRI Area 12.

2.5.10 PRI Area 13 – Buffer Area North and East

2.5.10.1 Site Description and Sampling Requirement

PRI Area 13, the Buffer Area North and East, is situated to the north and east of the Northeast Ponded Waste Lagoon (PRI Area 7). It is a low-lying, mudflat/playa area within the historical shoreline of the Great Salt Lake which could be impacted by liquid waste and fugitive solid waste.

The Phase 1A RI SAP identified collection of 14 surface solids samples from PRI Area 13 (locations PRI13-001 through PRI13-014). The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI13-003 and PRI13-012).

2.5.10.2 Sampling Dates

Sampling was conducted on December 5, 6, and 7, 2013.

2.5.10.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of nine of the 14 surface solids samples in PRI Area 13 (locations PRI13-001, PRI13-003, and PRI13-008 through PRI13-014), and accept two split samples (PRI13-03-SS01-120613-ES01 and PRI13-12-SS01-120613-ES01). The surface solids sample from location PRI13-003 was collected in a non-vegetated mud-flat area on the north side of PRI Area 13 (Photo 56, Appendix C). The surface solids sample from location PRI13-012 was collected in a slightly raised and sparsely vegetated area on the east side of PRI Area 13 (Photo 57, Appendix C). All solids samples were collected at the locations proposed in the Phase 1A RI SAP. Sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 6 inches from five grab sample aliquots using a hand auger, with the exception of location PRI13-003 which required one additional aliquot to accommodate for the split sample. ERM submitted Field Modification Approval Form 14C-1-8 for the additional aliquot and it was signed by the PWT field representative on December 6, 2013. Sample recoveries were generally around 100 percent. The samples were generally easily worked through a ¼-inch sieve with approximately 95 to 100 percent of material passing through the sieve.

2.5.10.4 Air Monitoring/Health and Safety Considerations

No chlorine gas was detected above field action levels during the field work conducted in PRI Area 13.

2.5.10.5 General Observations

The majority of the PRI Area 13 is not vegetated. There was shallow standing water along the west side of the eastern portion of PRI Area 13. The eastern portion of PRI Area 13 is frequently traversed by brine shrimpers on all-terrain vehicles (ATVs) during shrimp season. The shrimpers drive their ATVs through nearly the entire eastern portion of PRI Area 13; many of the solids sample locations had ATV tracks on or near the sample location.

2.5.11 PRI Area 14 – Buffer Area South

2.5.11.1 Site Description and Sampling Requirement

PRI Area 14, the Buffer Area South, is situated to the south of the Southeast and Northeast Ponded Waste Lagoons, PRI Areas 5 and 7. PRI Area 14 consists of a network of large-area Great Salt Lake evaporation ponds and ditches (covering thousands of acres) that are used to collect water from the Great Salt Lake, and the ditches are used to move the progressively more evapo-concentrated waters from pond to pond until the water is ultimately piped to the Star Pond on the US Magnesium facility for further processing and extraction of magnesium. It is a low-lying area within the historical shoreline of the Great Salt Lake which could be impacted by liquid waste and fugitive solid waste. It consists of active and inactive solar evaporation ponds.

The Phase 1A RI SAP identified collection of 15 surface solids samples from PRI Area 14 (locations PRI14-001 through PRI14-015), one collocated subsurface solids sample at location PRI14-005, and 4 collocated surface water samples at locations PRI14-005, PRI14-006, PRI14-008, and PRI14-013. The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI14-005 and PRI14-006), from one subsurface sampling interval at location PRI14-005, and from three of the four surface water sample locations (PRI14-005, PRI14-008, and PRI14-013). The surface water samples are formally considered as part of PRI Area 17, Site-Wide Water, but field observations are discussed here.

2.5.11.2 Sampling Dates

The surface solids samples from locations PRI14-012, PRI14-014, and PRI14-015 were collected on November 26, 2013, and locations PRI14-001 through PRI14-011 were collected on December 2, 3, and 4, 2013. Surface solids samples at locations PRI14-005 and PRI14-006 were re-sampled on December 11, 2013 (see discussion below). The subsurface solids sampling at location PRI14-005 was conducted on December 16, 2013. The surface water samples at locations PRI14-008 and PRI14-013 were collected on November 19, 2013, PRI14-006 on November 20, 2013, and PRI14-005 on February 11, 2014.

2.5.11.3 Surface Solids and Collocated Surface Water Sample Collection

PWT was on site to oversee the collection of surface solids samples from locations PRI14-001, PRI14-003, PRI14-004, RPI14-005, and PRI14-006 and accept split samples from locations PRI14-005 and PRI14-006. Due to ERM operating with more than one field sampling team, PWT did not witness the collection of the other surface solids samples. PWT originally collected a split sample at location PRI14-003; however, because ERM was collecting additional sample volume for fine fraction analyses, it was realized after sample homogenizing that there was not enough sample volume to fill all the split sample containers. All solids samples were collected at the locations proposed in the Phase 1A RI SAP. All sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 6 inches from 5 grab sample aliquots using a hand auger. The salt crust at some of the sample locations was generally difficult to work through a ¼-inch sieve and much had to be discarded, but the percentage of sample material that passed through the sieve was generally high. Sample location PRI14-001 is on a graded road that parallels the Skull Creek Diversion Ditch on the west side of the ditch and the surface soil was disturbed. At location PRI14-004, ERM filled a pan with sample volume then returned to field vehicle to collect VOC sample fractions in En Core® Samplers; this was seen as a deviation from the SOP which calls for collecting En Core® Samplers immediately after extraction of first auger aliquot.

FedEx temporarily misplaced ERM's sample cooler which resulted in VOC sample fractions from locations PRI14-006, PRI14-007, and PRI14-008 not making it to the laboratory within analysis holding time. ERM requested that their laboratory discard the VOC sample fractions from these samples and proceed with analyzing and reporting for all of the other analytes. PWT had a surface solids split sample from location PRI14-006, including MS/MSD volume for VOCs. The Contract Laboratory Program laboratory had already analyzed VOCs for this sample so PWT requested the laboratory not report the VOC results. Consequently, ERM re-collected

VOC sample fractions from locations PRI14-006, PRI14-007, and PRI14-008 on December 11, 2013, and PWT accepted a split sample for VOCs from location PRI14-006.

PRI14-006

PWT did not observe the collection of the collocated surface water sample at location PRI14-006 on November 20, 2013. On December 3, 2013, PWT was on site to oversee the collection of surface solids sample PRI14-006 and accept a split sample (PRI14-06-SS01-120313-ES01). Sample location PRI14-006 was located in a saturated salt crusted area adjacent to a channel with flowing surface water (Photo 58, Appendix C). All sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. The surface solids sample from location PRI14-006 was collected from 0 to 6 inches from 5 grab sample aliquots using a hand auger. Sample recoveries were good but the firm salt crust was not breaking up very well and was difficult to work through a ¼-inch sieve; most of the salt crust had to be discarded.

On December 11, 2013, the Field Team returned to PRI14-006 for the re-collection of VOC sample fractions. The En Core® Samplers were collected from one hand auger aliquot. PWT accepted split sample PRI14-006-SS01-121113-ES01 including MS/MSD volume. The black silty sediment beneath the salt crust was used to fill the En Core® Samplers.

PRI14-008

On November 19, 2013, PWT was on site to oversee the collection of the surface water sample at location PRI14-008, located near the center of the largest ponded water body in that section of PRI Area 14. The ERM team loaded a small Pelican boat with coolers and other sampling equipment. The water was shallow enough for the ERM field personnel to walk to the sample location so the team donned waders and escorted the boat into the water approximately 150 feet from the shore. PWT did not accompany ERM to the sampling location; the sampling was observed from the shoreline to the south (Photo 59, Appendix C). Surface water sampling was performed using a peristaltic pump with new ⅝-inch silicone tubing with the pump and new ½-inch polyethylene tubing to convey the water to and from the pump. The sample splitter was used for all non-VOC analyte split sample fractions. Water sampling witnessed by PWT was conducted in general accordance with SOP USM-08, *Surface Water Sampling*.

The water was clear and had a pH of 6.48. No chlorine was detected. A 10 to 1 dilution was performed for conductivity. As with most samples collected during the Phase 1A RI, excess NaOH was needed to stabilize the CN fraction to a pH of greater than 12; however, for split sample from location PRI14-008, the volume of NaOH added to CN sample fractions for the split sample did not match the volume added by ERM. The split sample CN bottles were filled to the top with NaOH (about 600 drops) and pH only increased from 6 to 10. Preservation for the split sample was not performed immediately following sample collection.

PWT did not observe the collection of the collocated surface solids sample at location PRI14-008 on December 2, 2013, or the re-sampling for VOCs on December 11, 2013.

PRI14-013

On the morning of November 19, 2013, prior to mobilizing to surface water sample location PRI14-013, ERM tested the Tygon tubing in the peristaltic pump and it was too rigid to work with the pump they had. ERM requested permission to use silicone tubing in place of Tygon tubing in the peristaltic pump until they received a different peristaltic pump. ERM submitted Field Modification Approval Form 14C-1-2 requesting to use silicone tubing, in place of the Tygon tubing, with the peristaltic pump for surface water sampling on November 19, 2013, in PRI Area 14 and EPA approved the modification.

On November 19, 2013, when the Field Team arrived at surface water sample location PRI14-013, the surface water body was too shallow (< 1 inch deep) to sample. ERM requested that the sample location be moved approximately 200 feet to the north in the nearest surface water body that was deep enough to sample (approximately 2 inches deep) (Photo 60, Appendix C). ERM submitted Field Modification Approval Form 14C-1-1 for the change in location and PWT approved the proposed change. ERM collected a surface water sample at the revised PRI14-013 location (Photo 61, Appendix C) and PWT accepted a split sample (PRI14-08-SW01-111913-ES01). The VOC sample fraction was collected first, then field filtered fractions, then remaining fractions. This is a deviation from SOP USM-08, *Surface Water Sampling*, which states field filtered fractions are collected last. The order specified in the SOP did not account for field filtered fractions being pumped through the sample splitter. This change was considered minor and not significant enough to warrant a field or Phase 1A RI SAP modification. This order of sample fraction collection was followed at all split sample locations.

ERM was unable to use a 0.2 micron filter for secondary filtering of the hexavalent chromium sample fractions due to clogging. As with most samples collected during the Phase 1A RI, excess NaOH was needed to stabilize the CN fraction to a pH of greater than 12; however, for split sample PRI14-008, the volume of NaOH added to CN sample fractions for the split sample did not match the volume added by ERM; post-preservation was done independently. The split sample CN bottles were filled to the top with NaOH (about 550 drops) and pH only increased from 6 to 10. Preservation for the split sample was not performed immediately following sample collection.

PRI14-005

Surface Solids Sample Collection at PRI14-005: On December 4, 2013, ERM collected surface solids sample PRI14-005-SS01-120413 from a mounded area of disturbed soil on a shore area, approximately 5 feet from the salt flat area where surface water occurs at location PRI14-005 (Photo 62, Appendix C). PWT accepted a split sample from this location (PRI14-005-SS01-120413-ES01); however this sample was never analyzed. On December 5, 2013, ERM notified EPA that location PRI14-005 is identified for collocated collection of surface solids and surface water, and therefore ERM proposed to re-sample location PRI14-005 to obtain a sample from the saturated sediment in the salt flat area where the surface water sample will be collected. ERM requested that their laboratory discard sample PRI14-005-SS01-120413 prior to performing any extractions or analyses, and PWT did the same for the split sample.

On December 11, 2013, PWT was on site to oversee collection of the surface solids sample at location PRI14-005 and accept split sample (PRI14-05-SS01-121113-ES01). The sample location was moved to the saturated salt flat area 8 feet west-southwest of the original staked location. All sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. The sample was collected from 0 to 6 inches from 7 grab sample aliquots using a hand auger. The 2 additional aliquots were required to accommodate for the split sample. ERM submitted Field Modification Approval Form 14C-1-11 for the additional aliquots and it was signed by the PWT field representative on December 11, 2013. The hand auger holes were advanced adjacent to the steel bowls that were placed in the sediment for the PRI14-005 collocated surface water sample location (Photo 63, Appendix C). Sample recoveries were around 99 percent and the samples were generally easily worked through a ¼-inch sieve. The surface soil observed at location PRI14-005 was saturated black sandy silt with a salt crust and approximately 2 inches of frozen water on the surface.

<u>Borehole Drilling and Subsurface Solids Sample Collection at PRI14-005</u>: On December 16, 2013, PWT was on site to oversee the advancement of the boreholes and collection of all subsurface solids samples at sample location PRI14-005. Three boreholes were advanced to a depth of approximately 6 feet bgs at sample location PRI14-005 and the three 2-foot sample intervals were set at 0.5 to 2 feet bgs, 2 to 4 feet bgs, and 4 to 6 feet bgs. The boreholes were advanced in a triangle pattern about 6 to 8 inches apart in a saturated salt flat area approximately 5 feet east of the PRI14-005 surface sample location stake (Photo 64, Appendix C). ERM contracted Direct Push Services to provide the necessary equipment and personnel to advance the borings. The soil borings were advanced using a track-mounted direct-push rig (Geoprobe 7730DT rig). During the advancement of the borehole, the borehole was continuously cored in a 1.5-inch PVC liner for logging of subsurface lithology.

The entire sampling interval was saturated and there was poor recovery in all boring cores, particularly in the 2- to 3.5-foot interval (Photo 65, Appendix C). Core samples were extracted in 5-foot sections of PVC tubes. For each of the three boreholes, the first core was driven to 4 feet bgs and removed, then the 4- to 6-foot interval was cored through the same hole; there was up to 6 inches of slough in the 4- to 6- foot push but the holes stayed open. Soil from the core sample was used for classification according to ERM's Soil Logging Procedure. There was poor recovery in all cores. A tape measure was not used by ERM to measure lithologic intervals, they just estimated visually. PWT reviewed ERM's boring logs in the field and generally concurred with the lithology descriptions.

PWT accepted one subsurface solids split sample from location PRI14-005, assembled from two of the three sampling intervals (PRI14-005-SB02-2-121613-ES01 and PRI14-005-SB03-4-121613-ES01). There was not enough sample volume to fill all of the split sample containers from one sample interval (Photo 66, Appendix C). The sample distribution for the split sample was as follows:

- PRI14-05-SB03-4-121613-ES01: PCBs, PCDD/PCDF, metals, TOC, VOCs, SVOCs, PAHs, and pH
- PRI14-05-SB02-2-121613-ES01: perchlorate

En Core® Samplers for VOCs analysis were immediately driven into the soil core, prior to sieving and homogenizing. En Core® Samplers were collected from the first boring core in a saturated, silty sand encountered from 5.5 to 6 feet bgs. Due to the softness of the sediment, the plunger bottom of the En Core® Sampler had to be pushed into the coring body by hand prior to pushing into the sediment (pre-engaged) and was driven by hand rather than being driven with an En Core® T-Handle as designed. Also, because the initial push into the sediment did not completely fill the coring body, the samplers had to be "topped off" and filled by hand.

All subsurface solids sampling witnessed by PWT was conducted in general accordance with SOP USM-09, *Subsurface Soil, Sediment, and Waste Sampling*. At some locations, the complete ERM Subsurface Clearance Process (Section 6.2, Item 1) was not conducted and PID screening was not performed (Section 6.3.1, Items 8-11). After reaching total depth, each borehole was not backfilled with bentonite chips and hydrated after placement. PWT did not witness the decontamination of the drilling equipment before or after the advancement of the boreholes at this location.

Surface Water Sample Collection at PRI14-005: On November 21, 2013, a shovel was used to excavate a sampling basin in areas with shallow water depths to allow for use of the peristaltic pump and the area immediately filled in with black saturated silt. On November 26, 2013, ERM excavated the area with a shovel and placed two steel bowls in the excavated area. The bowls filled with black silty water which did not settle out that day; therefore, ERM decided to let the sediment settle out and let the area flush out with surface water and return at a later date to collect the surface water sample. The surface subsequently became frozen and sampling was postponed.

On February 11, 2014, PWT was on site to oversee the collection of the surface water sample at location PRI14-005. Surface water sampling was performed using a peristaltic pump with new ⅝-inch Tygon tubing with the pump and new ½-inch polyethylene tubing to convey the water to and from the pump. The water intake side of the tubing was attached with zip ties to a PVC pipe and placed at the mid-point of the water in one of the steel bowls. The depth of the surface water surrounding the bowls was approximately 0.5 inches deep with a slow easterly flow. The sample splitter was used for all non-VOC analyte split sample containers. Water sampling was conducted in general accordance with SOP USM-08, *Surface Water Sampling*.

The water had a pH of 5.98 and turbidity that was out of instrument range, at greater than 1,000 nephelometric turbidity units. The water had a slight rotten egg smell. As with most samples collected during the Phase 1A RI, excess NaOH was needed to stabilize the CN fraction to a pH of greater than 12. Chlorine was detected at 0.11 mg/L.

There is a very slow flowing seep to the north-northwest of sample location PRI14-005. The seep is identified by the iron coloring and crust, and surface saturation (Photo 67, Appendix C). During surface water sampling at location PRI14-005, a slow easterly flow of surface water was observed. The seep may be contributing surface water at this location but most of the surface water at PRI14-005 was being fed by a large pool to the west. The area to the north of PRI14-005 appears to have been graded at some point. Remnants of the conveyance pipe through the road were observed on the south side of the bermed road that runs east-west along the northern perimeter of PRI Area 14.

2.5.11.4 Air Monitoring/Health and Safety Considerations

Chlorine gas was detected above field action levels during the field work conducted in PRI Area 14 and the field team had to don respirators on more than one occasion. In some areas there was soft saturated silt below a salt crust layer which often broke through when walking on the surface of it making it challenging to walk through.

2.5.11.5 General Observations

PRI Area 14 is the most diverse of the PRI areas. Outside of the active solar pond portions of PRI Area 14, PWT observed four distinct surface soil areas: (1) low-lying former ponded areas with no vegetation and surface soil consisting of a firm silt loam with clay; (2) low-lying former ponded areas with no vegetation and surface soil consisting of a firm ½-inch salt crust underlain by soft saturated silt; (3) slightly raised areas surrounding the low-lying former ponded areas with sparse salt-desert shrub vegetation and surface soil consisting of a sandy/gravelly loam; and (4) raised area on the west side of PRI Area 14 with denser salt-desert shrub vegetation and surface soil consisting of a dry silt loam. The surface water in the areas sampled during the Phase 1A RI was less than 1 foot deep. Many different avian species were observed in and around the surface water in PRI Area 14.

2.5.12 PRI Area 15 – Buffer Area West

2.5.12.1 Site Description and Sampling Requirement

PRI 15, Buffer Area West, includes the alluvial upland areas west of the US Magnesium facility, including both the foothills of the Lakeside Mountains and the salt-desert shrub area between the mountains and the Great Salt Lake. Buffer Areas West is believed to be impacted primarily by windblown stack and fugitive emissions. The Phase 1A RI SAP identified collection of 14 surface solids samples from PRI Area 15 (locations PRI15-001 through PRI15-014). The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI15-002 and PRI15-010).

2.5.12.2 Sampling Dates

With the exception of the sample from location PRI15-008, all surface solids sampling in PRI Area 15 was conducted on November 22, 23, and 24, 2013. Sample collection at location PRI15-008 was postponed because it was located on private property and ERM did not yet have an access agreement with the property owner. ERM submitted Record of UFPQAPP-SAP Modification 14C-2-9 for moving sample location PRI15-007 from private property onto public land and for moving sample location PRI15-008 from private property onto ATI property to help facilitate access for sampling; however, ERM eventually obtained approval from the private property owner to collect sample PRI15-008 at the original Phase 1A RI SAP location. Therefore, on January 13, 2014, ERM submitted Field Modification Approval Form 14C-1-17 to collect surface solids sample PRI15-008 at the original proposed location in the Phase 1A RI SAP. The sample from location PRI15-008 was collected on January 13, 2014.

2.5.12.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of surface solids samples from locations PRI15-002, PRI15-004, PRI15-008, and PRI15-010, and accept two surface solids split samples (PRI15-02-SS01-112413-ES01 and PRI15-10-SS01-112413-ES01). The sample from location PRI15-002 was collected in a flat vegetated area north-northwest of the facility and PRI15-010 was collected on mounded soil at the edge of flat area to the south of the facility (Photos 68 and 69, Appendix C). All solids samples were collected at the locations proposed in the Phase 1A RI SAP. All sampling witness by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*. All samples were collected from 0 to 2 inches from five grab sample aliquots using a flat-bottom scoop (Photo 70, Appendix C). Scoops collected a cake like portion of soil from a 4- by 4-inch area, 2 inches deep. The samples were generally easily worked through a ¼-inch sieve with approximately 95 to 100 percent of material passing through the sieve. The surface soil observed in PRI Area 15 was predominantly clayey silt. No saturated soil was observed in PRI Area 15; therefore no VOC sample fractions were collected.

2.5.12.4 Air Monitoring/Health and Safety Considerations

No chlorine gas was detected above field action levels during the field work conducted by PWT/EPA in PRI Area 15.

2.5.12.5 General Observations

The majority of the area is vegetated, primary with greasewood shrubs. The entire PRI is used by ranchers for cattle grazing. The area has abundant animal burrows of varying sizes. Antelope were observed. The dirt roads used to access sample locations in PRI Area 15 are extremely dusty in dry weather and muddy in wet weather.

2.5.13 PRI Area 16 – Lakeside Mountain Buffer Area

2.5.13.1 Site Description and Sampling Requirement

PRI Area 16, Lakeside Mountain Buffer Area, includes the upland and rocky mountain areas west of the US Magnesium facility. The Lakeside Mountain Buffer Area is believed to be impacted primarily by windblown stack and fugitive emissions.

The Phase 1A RI SAP identified collection of 14 surface solids samples from PRI Area 16 (locations PRI16-001 through PRI16-014). The Phase 1A OS QAPP identified split samples from two of the 14 surface solids sample locations (PRI16-004 and PRI16-008).

2.5.13.2 Sampling Dates

All sampling was conducted between November 19 and 23, 2013.

2.5.13.3 Surface Solids Sample Collection

PWT was on site to oversee the collection of surface solids samples from locations PRI16-004 and PRI16-008, and accept split samples from each location (PRI16-04-SS01-112013-ES01 and

PRI16-08-SS01-112013-ES01). Seven of the 14 sample locations proposed in the Phase 1A RI SAP were modified due to terrain/inaccessibility or property ownership issues (Record of UFPQAPP-SAP Modification 14C-2-9); all other samples were collected at the locations proposed in the Phase 1A RI SAP. The sample from location PRI16-004 was collected on a steep face on the eastern slope of the Lakeside Mountains west-northwest of the facility and PRI16-008 was collected west of the facility approximately 50 feet up the initial mountain slope from the valley floor (Photos 71 and 72, Appendix C). All samples were collected from 0 to 2 inches from five grab sample aliquots using a flat-bottom scoop. The exact location of each aliquot around the stake was selected randomly but biased to avoid rocky locations. No preference was given to areas of exposed soil versus vegetated areas. At location PRI16-008, there was grass on the surface at many of the scoop locations and the grass had a dense root structure. ERM was very thorough in trying to remove all the soil from the roots (Photos 73 and 74, Appendix C). Scoops collected a cake like portion of soil from a 4- by 4-inch area, 2 inches deep for location PRI16-004 and 4- by 6-inch area, 2 inches deep for location PRI16-008 because additional sample volume was needed for MS/MSD volume. The samples were generally easily worked through a ¼-inch sieve with approximately 95 to 99 percent of material passing through the sieve. The surface soil observed in PRI Area 16 was predominantly clayey silt with gravel. No saturated soil was observed in PRI Area 16; therefore no VOC sample fractions were collected. All sampling witnessed by PWT was conducted in general accordance with SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*.

2.5.13.4 Air Monitoring/Health and Safety Considerations

No chlorine gas was detected above field action levels during the one day of field work conducted by PWT in PRI Area 16. The stack plume was observed to settle in the valleys of the Lakeside Mountains at times, and travel along the eastern slope of the mountain range at other times.

2.5.13.5 General Observations

The majority of the area is vegetated, primary with greasewood shrubs. The eastern slope of the Lakeside Mountains in PRI Area 16 is used by ranchers for cattle grazing. The area has abundant animal burrows of varying sizes. Antelope were observed. Some of the terrain has very steep and rocky slopes. The dirt roads used to access sample locations in PRI Area 16 are extremely dusty in dry weather and muddy in wet weather.

2.5.14 PRI Area 17 – Site-Wide Water

2.5.14.1 Site Description and Sampling Requirement

PRI Area 17, Site-Wide Water, includes all surface water bodies and groundwater wells across the Site. During the Phase 1A RI activities, surface water was present in PRI Areas 1, 4, 5, 6, 7, 8, and 14, and groundwater wells were present in PRI Areas 1, 2, and 4 through 14. For this Technical Memorandum, surface water sampling activities are reported with the PRI area from which they were collected (sections above) and groundwater activities are reported as part of PRI Area 17 because some surface water samples were associated with a collocated sediment sample

and are reported along with the associated sediment sample and the photographs and field notes for each of these sampling pairs are interrelated.

2.5.14.2 Well Installation Requirements

In mid-November 2013, prior to initiating groundwater monitoring well installation activities, EPA and ERM modified some of the groundwater monitoring well specifications. These modifications were captured in Record of UFPQAPP-SAP Modification 14C-2-13.1 through 13.4. On November 15, 2013, in Record of UFPQAPP-SAP Modification 14C-2-13.1, EPA required that the Phase 1A RI SAP be modified to add shallow nested wells for locations MW-13, MW-14, and MW-15, making them paired groundwater wells with shallow (A) completions and deep (B) completions. The shallow wells were in response to new lithological information provided by ERM which suggested a saturated interval located above the most shallow clay layer. In addition, the locations of wells MW-13, MW-14, and MW-15 were adjusted to be approximately 20 feet upgradient of the cut-off wall/trench (key wall) installed by US Magnesium along the isthmus road between PRI Area 6 and PRI Area 7.

2.5.14.3 Well Installation Activities

The 12 new groundwater monitoring wells were installed between December 3 and 9, 2013 and on January 13, 2014 (MW-16). PWT, supported by Tetra Tech, was on site to oversee all of the borehole drilling and logging, and nearly all of the well construction activities. Mr. Robert Howe (Tetra Tech) was on site the week of December 2, 2013 to observe the borehole coring and installation of select monitoring wells. PWT reviewed ERM's boring logs in the field and generally concurred with the lithology descriptions. Subsurface solids samples were not collected from any of the well borings. All monitoring well installation procedures witnessed by PWT were conducted in general accordance with SOP USM-10, *Monitoring Well Installation and Development*, with the exception of well MW-16. The general installation procedures for groundwater monitoring wells MW-13A/B, MW-14, MW-15A/B, MW-17, MW-18, MW-19A/B, and MW-20A/B were as follows.

Prior to initiating the field activities for the installation of the wells, a ground penetrating radar was used to locate underground utilities in the area around the well location; no underground utilities were identified at any of the proposed well locations. Well construction permits were not obtained because all the wells were less than 30 feet deep (Section R655-4 Utah Annotated Code; UDWR 2011). The initial five feet of the soil borings were advanced using a hand auger. The soil borings were drilled past the initial five feet with a track-mounted, hollow-stem auger drill rig using 8-inch outer diameter hollow-stem augers. ERM contracted Direct Push Services to provide the necessary equipment and personnel to drill the borings and install the wells.

During drilling, each borehole was continuously cored for logging of subsurface lithology. Soil cores were collected by driving a modified, California-type, split-spoon sampler, equipped with 5-foot sections of PVC tubes. Wells were installed within the annulus of the hollow stem auger. The screened interval of each well was constructed of 2-inch diameter, Schedule 80 PVC well casing with 0.01-inch wide horizontal slots, and the remaining length of the well was constructed of blank, 2-inch diameter, Schedule 80 PVC casing. 20/40 sand was used as the filter pack from total depth to approximately one foot above the screened interval in each well. Following

completion, the well was surged with a rig-mounted surge block prior to setting the bentonite seal. A 1-foot seal composed of hydrated bentonite chips was placed above the filter pack. The remaining annulus space was backfilled with either Portland cement or hydrated bentonite chips.

Each well was completed at the surface with an above ground monument steel well vault set in concrete. SOP USM-10, *Monitoring Well Installation and Development*, calls for a 3-foot by 3-foot concrete pad around the steel protective casing and for the concrete not to be placed prior to 24-hours after setting the steel protective casing. However, as proposed, and approved, in Field Modification Approval Form 14C-1-9, ERM constructed a 2-foot by 2-foot concrete pad around the steel protective casing and poured the concrete for the pad immediately following well installation.

Wells MW-13A and MW-13B

On December 4, 2013, PWT oversaw the installations of wells MW-13A and MW-13B which are located at the north end of PRI Area 6. Subsurface soils encountered during the installation of wells MW-13A and MW-13B were generally consistent with the lithology shown in Record of UFPQAPP-SAP Modification 14C-2-13.1 and the wells were completed as proposed. The borehole for MW-13B was advanced to a depth of approximately 20 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 9 to 19 feet bgs. The borehole for MW-13A was advanced to a depth of approximately 7 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 2 to 7 feet bgs.

Well MW-14

On December 4, 2013, PWT oversaw the installation of well MW-14 which is located along the east shore of the ponded waste lagoon in PRI Area 6. During the drilling of the borehole for the installation of well MW-14, a clay layer was encountered from 3 to 5 feet bgs, which was inconsistent with the lithology shown in Record of UFPQAPP-SAP Modification 14C-2-13.1. On December 5, 2013, due to the change in the expected lithology, ERM submitted Field Modification Approval Form 14C-1-6 proposing to not install shallow well (MW-14A), to change the screened interval of well MW-14B to between 5 to 15 feet bgs, and to change well ID to MW-14; EPA approved the field modification. The boring was advanced to a depth of approximately 15 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 5 to 15 feet bgs.

Wells MW-15A and MW-15B

On December 5, 2013, PWT oversaw the installation of wells MW-15A and MW-15B which are located along the southeastern shoreline in PRI Area 6. Subsurface soils encountered during the installation of wells MW-15A and MW-15B were generally consistent with the lithology shown in Record of UFPQAPP-SAP Modification 14C-2-13.1 and the wells were completed as proposed. The borehole for MW-15B was advanced to a depth of approximately 20 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 9 to 19 feet bgs. The borehole for MW-15A was advanced to a depth of approximately 7 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 2 to 7 feet bgs.

Well MW-16

On January 13, 2014, PWT oversaw the installation of well MW-16 which is located along the northern edge of the gypsum pile at the shoreline of the ponded waste lagoon in PRI Area 6, at that time. The specifications for well MW-16 were presented in Record of UFPQAPP-SAP Modification 14C-2-13.2. The well was installed in saturated gypsum approximately 5 feet from the edge of the wastewater pond. A 6-inch diameter hand auger bucket was used to advance the borehole for MW-16. The auger hole was advanced to an approximate depth of 20 inches bgs. Soft sandy clay was encountered at approximately 18 inches bgs and firm clay was encountered at approximately 20 inches bgs; saturated gypsum was observed above the clay. The auger hole stayed open after augering but filled with about 8 inches of water. ERM used a pre-packed well casing comprised of 2-inch diameter, 12-inch long, 0.010 slotted, Schedule 40 PVC inner casing and a 4-inch diameter outer casing with 20/40 silica sand packed between the inner and outer slotted PVC casing (Photo 75, Appendix C). A 2-inch long threaded PVC cap was placed at the bottom of the 2-inch threaded casing and about 3 feet of blank 2-inch diameter Schedule 40 PVC casing was threaded to the top of the slotted casing. The 12-inch long well screen was set from 6 to 18 inches bgs. The pre-packed well casing was placed in the auger hole and 20/40 silica sand was added from total depth to approximately 2 inches above the well screen (4 inches bgs). Bentonite chips were added to the top 4 inches and slightly piled up around the well casing at the surface. Distilled water was added to hydrate the bentonite chips. A measuring tape was used to measure all stages of construction. The well was slightly off from vertical (tilted) following installation. There is no above ground protective casing around the well (Photo 76, Appendix C). ERM submitted Field Modification Approval Form 14C-1-16 for the change in MW-16 well construction and EPA approved it on January 13, 2014.

Following installation of well MW-16, located downgradient of the gypsum pile (PRI Area 4) and upgradient of the Northwest Ponded Waste Lagoon (PRI Area 6), the wastewater level in the Northwest Ponded Waste Lagoon rose and wastewater surrounded the well making it inaccessible; therefore, well MW-16 was not developed or sampled during the Phase 1A RI.

Well MW-17

On December 2, 2013, PWT oversaw the advancement of the direct-push borehole for logging of subsurface lithology at well MW-17 location. PWT noticed that the driller brought 10/20 sand and SOP USM-10, *Monitoring Well Installation and Development*, calls for 20/40 sand, so the well could not be set that day. The borehole for well MW-17 was drilled at the location proposed in the Phase 1A RI SAP, which is in PRI Area 5 between the landfill and ponded wastewater. ERM hand augered to 5 feet bgs prior to drilling and then advanced drill rods down the same hole. The lithology observed at MW-17 was generally consistent with the lithology shown in Record of UFPQAPP-SAP Modification 14C-2-13.3; however, the break from clay to oolitic sand was slightly higher than predicted by a half foot at a depth of 8 feet bgs.

On December 9, 2013, ERM returned to set the well. The borehole for MW-17 that was advanced on December 2, 2013, could not be located initially because the surface was covered with snow. ERM advanced a second hole and later the original hole was uncovered and measured to be 13 feet northwest of where ERM had started the second boring. The second boring was advanced to a depth of approximately 17.5 feet bgs and converted into a groundwater

monitoring well with the screened interval set to extend from 7 to 17 feet bgs. Prior to well construction, approximately 20 gallons of potable water was poured down the auger to control flowing sands and approximately 6 inches of flowing sand came up into the auger. The original borehole was not abandoned (i.e. no bentonite chips were placed).

Well MW-18

On December 3, 2013, PWT oversaw the installation of well MW-18 which is located west of the facility adjacent to the smut piles in PRI Area 9. The lithology at MW-18 was not consistent with that presented in Record of UFPQAPP-SAP Modification 14C-2-13.3. There was two feet of fill at the top of the boring followed by 7 feet of fine-grained sand with silt. There was a clay layer between 9 and 12 feet bgs, followed by sand and silty sand to 21.5 feet bgs, and a silty layer from 21.5 to 22 feet bgs (total depth). Based on the observed lithology, ERM proposed to change the screen interval from 7 to 17 feet bgs to 12 to 22 feet bgs so it would be screened entirely across sand and not in clay. ERM submitted Field Modification Approval Form 14C-1-4 for the change in screen interval and EPA approved it on December 3, 2013.

Record of UFPQAPP-SAP Modification 14C-2-13.3 for MW-18 shows that ready mix cement or concrete would be used to seal the well from the bentonite seal to ground surface. ERM was concerned that the heat of hydration of the cement could damage the PVC well casing so ERM proposed to use bentonite chips to approximately 1.5 feet bgs, hydrate the chips in place, and then use QuickCrete cement to complete the well at the surface. ERM submitted Field Modification Approval Form 14C-1-5 for this change and EPA approved it on December 4, 2013.

Wells MW-19A and MW-19B

On December 3, 2013, PWT oversaw the installation of well MW-19B which is located in PRI Area 6. The drill rig experienced refusal at 25 feet bgs due to flowing sands; therefore, lithology was only logged in the core to a depth of 25 feet bgs. Lithology in MW-19B was generally consistent with that presented in Record of UFPQAPP-SAP Modification 14C-2-13.3, except a hard dark brown layer was observed in the otherwise oolitic sand layer and there were flowing sands. As a result of the flowing sands, ERM proposed to use a dual tube approach with a pre-packed well screen to reach the required depth. ERM submitted Field Modification Approval Form 14C-1-9 for the MW-19B construction changes and it was signed by the PWT field representative on December 9, 2013.

On December 9, 2013, the boring for MW-19B was drilled to a depth of approximately 33 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 15 to 25 feet bgs. The well was constructed with two 5-foot sections of 2-inch inner diameter and 3.4-inch outer diameter pre-pack well casing consisting of Schedule 40 PVC with 0.010-inch slots and factory packed 20/40 sand around the outside of the screen. Fifteen feet of blank 4-inch diameter, Schedule 40 PVC casing was placed above the well screen. Potable water was added to control flowing sands, and additional 20/40 sand (2.5 bgs) was added around the outside of the well casing to 20 feet bgs. The well was then surged with a surge block and bentonite chips were added and allowed to set for 30 minutes before adding Portland cement to surface. ERM was unable to core the clay layer shown in the Record of UFPQAPP-SAP

Modification; therefore, the last auger was photographed after it was removed to verify the presence or absence of clay in the auger flights. Clay was present in the 8-inch auger flights at approximately 28 to 29 feet bgs to the end of the auger which was approximately 33 feet bgs (Photo 77, Appendix C).

On December 9, 2013, ERM drilled MW-19A about 4 feet north of MW-19B to 17.5 feet bgs and added approximately 20 gallons of potable water to control flowing sands. ERM then added 20/40 sand, starting at 17 feet bgs and continuing to 6 feet bgs. The well was then surged with a surge block and bentonite chips were added from 6 to 2 feet bgs.

The water level in the Southeast Ponded Waste Lagoon rose following installation and wastewater surrounded well MW-19A/B at depths of 1 to 2 inches (Photo 78, Appendix C).

Wells MW-20A and MW-20B

On December 6, 2013, PWT oversaw the installation of wells MW-20A and MW-20B located on Hill Brothers property in PRI Area 12. The drill rig core barrel experienced refusal at 28.5 feet bgs due to flowing sands; therefore, lithology was only logged in the core to a depth of 28.5 feet bgs. ERM was unable to core the clay layer shown in Record of UFPQAPP-SAP Modification 14C-2-13.3; therefore, the augers were advanced to 30 feet bgs to attempt to verify the presence or absence of clay in the auger flights after it was removed, but no evidence of the clay was found. Lithology in MW-20A/B was generally consistent with that presented in Record of UFPQAPP-SAP Modification 14C-2-13.3, except for the depth and thickness of the layers and there were flowing sands. As a result of the flowing sands and the observed lithology, ERM proposed to change the screen interval of well MW-20A and proposed to use a pre-packed well screen for well MW-20B. ERM submitted Field Modification Approval Form 14C-1-7 for the MW-20A and MW-20B construction changes and it was signed by the PWT field representative on December 6, 2013.

On December 6, 2013, the boring for MW-20B was drilled to a depth of approximately 30 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 19 to 29 feet bgs. The well was constructed with two 5-foot sections of 2-inch inner diameter and 3.4-inch outer diameter pre-pack well casing consisting of Schedule 40 PVC with 0.010-inch slots and factory packed 20/40 sand around the outside of the screen (Photo 79, Appendix C). Nineteen feet of blank 4-inch diameter, Schedule 40 PVC casing was placed above the well screen. Additional 20/40 sand was added around the outside of the well casing to the extent plausible.

On December 6, 2013, the boring for MW-20A was drilled to a depth of approximately 17.5 feet bgs and converted into a groundwater monitoring well with the screened interval set to extend from 12 to 17 feet bgs.

Well Development

Both new and existing groundwater monitoring wells were developed prior to the Phase 1A RI sampling. The 19 existing wells identified for groundwater sample collection during the Phase 1A RI were redeveloped between December 2 and 6, 2013, and on January 24, 2014 (PZ-01). The new wells (with the exception of MW-16) were developed on December 6, 9, 10, 11, and 16,

2013. On December 10, 2013, PWT oversaw a portion of the development of well MW-14 (Photo 80, Appendix C). ERM contracted Direct Push Services to perform the well development. All well development procedures witnessed by PWT were conducted in general accordance with SOP USM-10, *Monitoring Well Installation and Development*, with the following exceptions:

- Section 6.4, Steps 8, 9, and 10: A well development rig was not used and the well was not developed with the use of a bottom discharge bailer or a surge block. The submersible pump, which has an outer diameter of about 1.5 inches according to ERM, was used to surge the well prior to pumping.
- Section 6.4, Step 13: A flow-through cell was not used with the Horiba U-52 water quality meter. ERM was collecting and analyzing grab samples for water quality parameters at a frequency of approximately every borehole volume.

According to ERM the water quality parameters in the wells stabilized relatively quickly, prior to reaching the minimum purge volume, and the wells had good recharge. Approximately 5 borehole volumes were removed from each well during development activities. Well development water was pumped into a poly tank and transferred to the US Magnesium catch basin drain which flows to the Central Ditch.

Well Survey

The location and top of casing elevation of the groundwater monitoring wells were surveyed on February 13, 2014, by a licensed land surveyor. Staff gauges were also surveyed. PWT was not present for this event.

2.5.14.4 Groundwater Monitoring Requirements

The Phase 1A RI SAP identified collection of 31 groundwater samples from 19 existing monitoring wells (LF-01, LF-03, MW-04A, MW05A, MW06, MW-07, MW-08A, MW-08B, PZ-01, PZ-04, PZ-06, PZ-08, PZ-10, PZ-12, PZ-16, PZ-18, PZ-22, PZ-24, and PZ-26) and 12 new wells (MW-13A, MW-13B, MW-14, MW-15A, MW-15B, MW-16, MW-17, MW-18, MW-19A, MW-19B, MW-20A, and MW-20B) (Record of UFPQAPP-SAP Modification 14C-2-13.4 identified 13 wells; MW-14 was completed as one well rather than a nested paired well). The Phase 1A OS QAPP identified split samples from six of the 31 groundwater sample locations (LF-01, LF-03, PZ-04, MW-18, MW-19A, and MW-19B).

Groundwater elevations in these monitoring wells and surface water elevations from the staff gauges (SG-1 through SG-5) are to be measured monthly. PWT oversight is not deemed to be necessary.

2.5.14.5 Sampling Dates

All groundwater sampling was conducted between January 31 and February 18, 2014.

2.5.14.6 Groundwater Sample Collection

PWT was on site to oversee the collection of 18 of the 31 groundwater samples (approximately 58 percent) (LF-01, LF-03, MW-4A, MW-5A, MW-6, MW-7, MW08A, MW08B, MW-13A, MW-13B, MW-15B, MW-18, MW-19A, MW-19B, PZ-04, PZ-08, PZ-10, and PZ-24). PWT did not verify whether groundwater sampling proceeded from areas of low contamination to areas of high contamination; however, all of the sampling equipment that could affect groundwater analytical results was disposable, with the exception of the sample splitter that was only used at split sample locations. PWT accepted groundwater split samples from six of the 31 locations (MW-18-01-021314-ES01, MW-19A-01-021414-ES01, MW -19B-01-021414-ES01, LF-01-01-021714-ES01, LF-03-01-021714-ES01, and PZ-04-01-021314-ES01) and one field duplicate at well MW-18 (MW-18-01-021314-ES02).

A cone (Decaport) sample splitter (Photo 81, Appendix C) was used for splitting samples when split samples were required (SOPs USM-07 and USM-08). ERM had one splitter and it was the only non-disposable water sampling equipment used. The splitter was decontaminated between uses and the outlet port tubing was replaced. ERM typically used 4 to 8 of the splitter outlet ports at any given time. The splitter performed sufficiently but did not always distribute the sample evenly between all sample containers. The water flow rate during sampling was typically not fast enough to fill up the splitter's funnel-shaped reservoir, and at lower flow rates the reservoir has to be filled above the exit ports in order to ensure uniform flow though all ports. During water sample collection through the splitter, sample containers corresponding to the same analyses were filled concurrently to the extent possible. The sample and split sample containers could not be filled exactly concurrent due to the uneven sample distribution through the splitter and the differences in sample volume and container size between ERM and EPA samples. Water from the splitter ports was not contained and caused splashing when the outlet port tubing was not inside a sample container.

WS#17 of the Phase 1A RI SAP, Section 17.3.2 states that SOPs should include procedures for monitoring of VOC emissions with vapor monitors before and during monitoring well and piezometer sampling. This procedure is not listed in SOP USM-07, *Depth to Water Measurement and Groundwater Sampling*, and was not performed in the field.

SOP USM-07, *Depth to Water Measurement and Groundwater Sampling*, states that a dedicated sampling tube shall be installed during the initial sampling event within each well/piezometer, at the desired sampling depth.[2] SOP USM-07 does not specify procedure for measuring the sampling tubing. ERM used arm lengths (stretching out tubing in arms as far as they extend - approximately 5 feet) to measure tubing length and tubing was not dedicated, which may result in slight variation in sampling depth. At some wells, the tubing was lowered to total depth and then retracted approximately 5 feet, while at other wells the tubing was lowered to a specific depth. The down-well sample tubing was removed from the well and disposed following sample collection.

[2] SOP USM-07 states "Select and record sampling depth(s) based on the objectives described in the SAP. If the SAP does not specify sampling depth criteria, the pump intake should be positioned at the mid-point of the wetted screened interval of the monitoring well/piezometer." The Phase 1A RI SAP does not specify sampling depth criteria.

SOP USM-07, *Depth to Water Measurement and Groundwater Sampling*, states that groundwater samples will be collected by the low-flow sampling methodology using a peristaltic pump and purging the well at a flow rate between 100 to 500 milliliters per minute (mL/min). When PWT first observed groundwater sampling, PWT noted that ERM was purging and sampling groundwater wells at flow rates much greater than 500 mL/min. On February 5, 2014, ERM submitted Field Modification Approval Form 14C-1-19 proposing to use pumping rates greater than 500 mL/min during groundwater sampling, provided drawdown in the well is less than 10 centimeters (0.33 feet), and EPA approved the modification. PWT observed ERM using pumping rates as high as approximately 1600 ml/min. No water level drawdown was observed at the higher flow rates. Following approval of the field modification, ERM lowered the flow rate when collecting VOCs sample fractions to minimize loss of volatile compounds.

The wells were purged until field parameter stabilization was achieved. Dissolved oxygen typically stabilized at 0.0 mg/L. Well MW-08B had the highest dissolved oxygen (2.95 mg/L) at stabilization out of all the wells observed. The highest total chlorine measurement observed was 0.08 mg/L (MW-19A); the High Range Chlorine Test Method (0.1 to 8 mg/L) did not need to be performed for any of the groundwater samples. Post-processing to dechlorinate haloacetic acid sample fractions was not required. At some well locations, the conductivity measured for the final round of water quality parameter measurements during well purging was out of range of the sensor (>100 mS/cm), and therefore, groundwater was diluted 10 times and the specific conductivity of the diluted groundwater was measured.

SOP USM-07, *Depth to Water Measurement and Groundwater Sampling*, states that sample fractions for perchlorate analysis must be filtered first through the 0.45 micron filter as a "prefilter" and then filtered again through a 0.2 micron syringe filter. The 0.2 micron syringe filter was attempted and repeatedly clogged, until it was disregarded. Both ERM and EPA sample fractions for perchlorate were only filtered with a 0.45 micron filter.

Excess NaOH and sample agitation was needed to raise the pH of sample fractions for CN analyses at almost all locations. Per SOP USM-07, *Depth to Water Measurement and Groundwater Sampling*, sample fractions for CN analysis require adjustment of pH to greater than 12 and total removal of residual chlorine. SOP USM-07 calls for NaOH to be added at five drop intervals and pH re-tested after each interval; however, due to difficulty in raising the pH to 12 and the larger volume of NaOH required, the NaOH volume was often increased per pH re-test interval. ERM established a maximum of 100 drops NaOH per 250 mL sample container; this maximum is not specified in SOP USM-07. For split samples, PWT matched what ERM did and added a maximum of 200 drops NaOH per 1 liter sample container. Precipitate formed in all sample containers, and color change was observed at some locations. No sodium arsenite was required to remove chlorine from CN sample fractions.

PWT did not observe filter blank collection.

Purge water was discharged to a 5-gallon bucket for subsequent transportation and disposal to the Central Ditch, with the exception of MW-08A/B which was discharged directly to the Main Ditch. Water from MW-08A had a yellow hue similar to wastewater.

2.5.14.7 General Observations

All of the groundwater wells seem to have a high specific capacity. During the Phase 1A RI, some of the monitoring wells in PRI Areas 5, 8, and 10 were surrounded by low pH surface water.

3.0 CONCLUSIONS AND RECOMMENDATIONS

During the Phase 1A RI, ERM collected 145 surface solids samples, 34 subsurface solids samples, 16 surface water samples, and 31 groundwater samples. PWT, with the support of Tetra Tech, provided oversight of the field activities and collected a total of 47 split samples of solid and aqueous media. Split samples were collected from 17 percent of the surface solids samples in each PRI area, from 29 percent of the water samples (PRI Area 17), and one subsurface solids sample was collected from each subsurface boring location[3]. Based on PWT field observations, ERM satisfactorily implemented the field activities pursuant to the EPA-approved plans. Implementation of the Phase 1A RI solid and aqueous sampling indicates the sampling methods used may be appropriate and successful for use during Phase 1B.

Overall there was consistency in the application of sampling protocols and documentation. Implementation of the Phase 1A RI field activities identified several areas for improvement which may be beneficial for Phase 1B. The following are general recommendations that are applicable to sampling both the solid and the aqueous media.

- To the extent possible for split samples, EPA and ERM should use the same sample containers;
- The post-processing should be the same for both investigative and split samples (e.g., performed consistently by ERM prior to acceptance of the sample by PWT);
- To the extent possible, work locations at any given time should be flexible based on weather and wind conditions and potential hazards associated with the facility operations should be indentified prior to the start of work;
- The water sample splitter's funnel-shaped reservoir should be filled above the exit ports in order to create a more uniform and consistent flow though all ports.
- The top (south side) of the Gypsum pile, adjacent to the chlorine gas outfall pipe and located at the confluence of the Chlorine Ditch and the Main Ditch, should be entered with extreme caution as there are frequently elevated chlorine gas levels in this area; and
- To the extent possible, collocated samples (e.g., surface water/sediment and surface solids/subsurface solids) should be collected at the same time.

The SOPs used during the Phase 1A RI were sufficient; however, areas were identified that could be improved. The following are specific recommendations for the SOPs:

- SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*, should include provision to collect additional aliquots for auger sampling and to widen scoops for scoop sampling if

[3] At two locations, more than one sample was required to complete the suite of chemical analysis; resulting in the collection and acceptance of a total of nine individual subsurface solids samples.

additional sample volume is required. The size, shape, and orientation of additional (>5) sample aliquots should be described.

- SOP USM-09, *Subsurface Soil, Sediment, and Waste Sampling*, should include provision to advance additional borings (or larger diameter core) to ensure that collection of adequate sample volume as required by replicate or split samples. The SOP should also include a description of how the sample material will be homogenized for the separate borings at similar intervals.
- SOP USM-01, *Surface Soil, Sediment, and Waste Sampling*, and SOP USM-09, *Subsurface Soil, Sediment, and Waste Sampling*, could be improved by including alternative homogenizing procedures for wet solids and clay.
- SOP USM-07, *Depth to Water Measurement and Groundwater Sampling*, should be revised to specifically identify the screened interval from which the samples shall be collected (e.g., middle of the screen).
- The equipment decontamination procedures (e.g., rinse water containerization) stated in SOP USM-10, *Monitoring Well Installation and Development*, should be revised to be consistent with SOP USM-03, *Equipment Decontamination*.

REFERENCES

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EPA. 2014. *Landfill Geophysical Survey Field Oversight Report*. April 3.

TABLES

Table 1
Sample and Split Sample Summary
US Magnesium NPL Site

Black Font: Surface Soil Samples | Brown Font: Subsurface Soil Samples | Blue Font: Water Samples

Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI Area 2 - Landfill							
PRI2-001	Surface Solid	1 Plus sieved	No	0			9Jan2014
PRI2-002	Surface Solid	1	No	0			9Jan2014
PRI2-003	Surface Solid	1	Yes	1	PRI2-03-SS01-010814-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 2.	8Jan2014
PRI2-004	Surface Solid	1	No	0			9Jan2014
PRI2-005	Surface Solid	1	No	0			9Jan2014
PRI2-006	Surface Solid / Subsurface Solid	1 / 8	Yes	1	PRI2-06-SB07-24-050714-ES01	To get a minimum of one split sample of subsurface solids from each boring.	7May 2014 8May2014
PRI2-007	Surface Solid	1	No	0			9Jan2014
PRI2-008	Surface Solid	1 Plus sieved	No	0			9Jan2014
PRI2-009	Surface Solid / Subsurface Solid	1 / 8 Plus sieved	Yes	1	PRI02-09-SB03-28.5-050614-ES01	To get a minimum of one split sample of subsurface solids from each boring.	6May2014 8May2014
PRI2-010	Surface Solid	1	Yes	1	PRI2-10-SS01-010814-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 2.	8Jan2014
PRI2-011	Surface Solid	1 Plus sieved	No	0			8Jan2014
PRI2-012	Surface Solid	1 Plus sieved	No	0			8Jan2014
PRI2-013	Surface Solid	1	No	0			9Jan2014
PRI2-014	Surface Solid / Subsurface Solid	1 / 7	Yes	1	PRI2-14-SB03-10-050714-ES01	To get a minimum of one split sample of subsurface solids from each boring.	7May2014 8May2014

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Sample and Split Sample Summary
US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI Area 4 – Gypsum Pile							
PRI4-008	Surface Water	1	No	0			26Nov2013
PRI4-013	Surface Water	1	Yes	1	PRI4-13-SW01-112513-ES01	To get approx. 20% split samples of surface water from PRI Area 17.	25Nov2013
PRI Area 7 – Northeast Ponded Waste Lagoon							
PRI7-001	Surface Water	1	No	0			20Nov2013
PRI7-003	Surface Water	1	No	0			20Nov2013
PRI7-007	Surface Water	1	Yes	1	PRI7-07-SW01-112113-ES01	To get approx. 20% split samples of surface water from PRI Area 17.	21Nov2013
PRI7-009	Surface Water	1	No	0			*25Nov2013: Not enough water to collect sample 5May2014: still no water at this location*
PRI7-013	Surface Water	1	Yes	1	PRI7-13-SW01-112213-ES01	To get approx. 20% split samples of surface water from PRI Area 17.	22Nov2013
PRI7-014	Surface Water	1	No	0			22Nov2013
PRI Area 8 – Northwest Lagoon Overflow							
PRI8-001	Surface Solid	1	Yes	1	PRI8-01-SS01-121713-ES01	To get approx. 20% split samples of surface solids from PRI Area 8.	17Dec2013
PRI8-002	Surface Solid	1	No	0			17Dec2013
PRI8-003	Surface Solid	1	No	0			17Dec2013
PRI8-004	Surface Solid	1	No	0			18Dec2013
PRI8-005	Surface Solid / Surface Water	2 / 1	Yes	1	PRI08-05B-SS01-050814-ES01	To get approx. 20% split samples of surface solids from PRI Area 8 and to target a saturated solids sample (which includes VOCs analysis).	*19Dec2013: Surface not accessible due to low pH wastewater* 25Nov2013 8May2014
PRI8-006	Surface Solid	1 Plus sieved	No	0			*19Dec2013: Surface not accessible due to low pH wastewater* 25Mar2014

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US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI8-007	Surface Solid	1 Plus sieved	No	0			18Dec2013
PRI8-008	Surface Solid	1	No	0			18Dec2013
PRI8-009	Surface Solid	1	No	0			18Dec2013
PRI8-010	Surface Solid	1	No	0			*19Dec2013: Surface not accessible due to low pH wastewater* 26Mar2014
PRI8-011	Surface Solid	1	No	0			17Dec2013
PRI8-012	Surface Solid	1 Plus sieved	No	0			17Dec2013
PRI8-013	Surface Solid	1	No	0			18Dec2013
PRI8-014	Surface Solid	1 Plus sieved	No	0			26Mar2014
PRI8-015	Surface Solid	1	Yes	1	PRI8-15-SS01-032514-ES01	To get approx. 20% split samples of surface solids from PRI Area 8.	25Mar2014
PRI8-016	Surface Solid	1 Plus sieved	Yes	1	PRI8-16-SS01-121913-ES01	To get approx. 20% split samples of surface solids from PRI Area 8.	19Dec2013
PRI8-017	Surface Solid / Subsurface Solid	1 / 3	Yes	1	PRI8-17-SB01-6-121613-ES01 (VOC, SVOC, PAH, perchlorate) and PRI8-17-SB02-8-121613-ES01(pH) and PRI8-17-SB03-10-121613-ES01 (metals, TOC, PCB, D/F)	To get a minimum of one split sample of subsurface solids from each boring.	*19Dec2013: Surface not accessible due to low pH wastewater* 25Mar2014 16Dec2013
PRI8-018	Surface Water	1	Yes	1	PRI8-18-SW01-021214-ES01	To get split samples of wastewater from PRI Area 8.	12Feb2014
PRI8-019	Surface Water	1	Yes	1	PRI8-19-SW01-021214-ES01	To get approx. 20% split samples of surface water from PRI Area 17.	12Feb2014

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US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI8-020	Surface Water	1	No	0			11Feb2014
PRI8-021	Surface Water	1	No	0			11Feb2014
PRI Area 9 – Smut Area							
PRI9-001	Surface Solid	1 Plus sieved	No	0			06Jan2014
PRI9-002	Surface Solid	1 Plus sieved	Yes	1	PRI9-02-SS01-010614-ES01	To get approx. 20% split samples of surface solids from different areas in PRI Area 9.	06Jan2014
PRI9-003	Surface Solid	1	No	0			06Jan2014
PRI9-004	Surface Solid	1 Plus sieved	No	0			07Jan2014
PRI9-005	Surface Solid	1	No	0			07Jan2014
PRI9-006	Surface Solid	1	No	0			07Jan2014
PRI9-007	Surface Solid	1	No	0			07Jan2014
PRI9-008	Surface Solid	1	No	0			07Jan2014
PRI9-009	Surface Solid	1	No	0			07Jan2014
PRI9-010	Surface Solid	1 Plus sieved	No	0			07Jan2014
PRI9-011	Surface Solid	1	Yes	1	PRI9-11-SS01-010614-ES01 and PRI9-11-SS01-010614-ES02	To get approx. 20% split samples of surface solids from different areas in PRI Area 9. Field duplicate location selected randomly to meet QC requirement of 10 % frequency for solids samples.	06Jan2014
PRI9-012	Surface Solid	1	No	0			20Dec2013
PRI9-013	Surface Solid	1 Plus sieved	No	0			20Dec2013
PRI9-014	Surface Solid	1	Yes	1	PRI9-14-SS01-122013-ES01	To get approx. 20% split samples of surface solids from different areas in PRI Area 9.	20Dec2013

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US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI Area 10 – Barium Sulfate Area							
PRI10-001	Surface Solid	1	No	0			12Dec2013
PRI10-002	Surface Solid	1	No	0			12Dec2013
PRI10-003	Surface Solid	1	Yes	2	PRI10-03-SS01-121213-ES01 and PRI10-03-SS01-121213-ES02	To get a minimum of two split samples of surface solids from different areas in PRI Area 10. Field duplicate location selected randomly to meet QC requirement of 10 % frequency for solids samples.	12Dec2013
PRI10-004	Surface Solid	1	No	0			12Dec2013
PRI10-005	Surface Solid	1	No	0			13Dec2013
PRI10-006	Surface Solid	1 Plus sieved	No	0			13Dec2013
PRI10-007	Surface Solid	1 Plus sieved	No	0			13Dec2013
PRI10-008	Surface Solid / Subsurface Solid	1 / 5 Plus sieved	Yes	1	PRI10-08-SB04-6-050514-ES01	To get a minimum of one split sample of subsurface solids from each boring.	17Dec2013 *17Dec2013: subsurface sample to be postponed to dryer weather* 5May2014
PRI10-009	Surface Solid	1 Plus sieved	No	0			13Dec2013
PRI10-010	Surface Solid	1	No	0			17Dec2013
PRI10-011	Surface Solid	1	No	0			17Dec2013
PRI10-012	Surface Solid	1 Plus sieved	No	0			16Dec2013
PRI10-013	Surface Solid	1	Yes	1	PRI10-13-SS01-121213-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 10.	12Dec2013
PRI10-014	Surface Solid	1	No	0			16Dec2013

Table 1
Sample and Split Sample Summary
US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI Area 11 – ATI Titanium Plant and US Magnesium Parking Lots							
PRI11-001	Surface Solid	1	No	0			7May1014
PRI11-002	Surface Solid	1	No	0			7May1014
PRI11-003	Surface Solid	1	Yes	1	PRI11-03-SS01-050614-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 11.	6May2014
PRI11-004	Surface Solid	1 Plus sieved	No	0			7May1014
PRI11-005	Surface Solid	1 Plus sieved	No	0			7May1014
PRI11-006	Surface Solid	1	No	0			7May1014
PRI11-007	Surface Solid	1 Plus sieved	No	0			7May1014
PRI11-008	Surface Solid	1	No	0			7May1014
PRI11-009	Surface Solid	1	No	0			7May1014
PRI11-010	Surface Solid	1 Plus sieved	No	0			7May1014
PRI11-011	Surface Solid	1	Yes	1	PRI11-11-SS01-050614-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 11.	6May2014
PRI11-012	Surface Solid	1	No	0			6May2014
PRI11-013	Surface Solid	1 Plus sieved	No	0			6May2014
PRI11-014	Surface Solid	1	No	0			6May2014
PRI Area 12 – Ancillary Worker Exposure Area							
PRI12-001	Surface Solid	1	No	0			10Dec2013
PRI12-002	Surface Solid	1	Yes	1	PRI12-02-SS01-121013-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 12.	10Dec2013
PRI12-003	Surface Solid	1	No	0			10Dec2013
PRI12-004	Surface Solid	1	No	0			10Dec2013

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US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI12-005	Surface Solid	1 Plus sieved	No	0			10Dec2013
PRI12-006	Surface Solid	1	No	0			10Dec2013
PRI12-007	Surface Solid	1	No	0			10Dec2013
PRI12-008	Surface Solid	1 Plus sieved	No	0			10Dec2013
PRI12-009	Surface Solid	1 Plus sieved	No	0			10Dec2013
PRI12-010	Surface Solid	1	Yes	1	PRI12-10-SS01-121013-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 12.	10Dec2013
PRI12-011	Surface Solid	1 Plus sieved	No	0			11Dec2013
PRI12-012	Surface Solid	1	No	0			12Dec2013
PRI12-013	Surface Solid	1 Plus sieved	No	0			12Dec2013
PRI12-014	Surface Solid	1	No	0			12Dec2013
PRI Area 13 – Buffer Area North and East							
PRI13-001	Surface Solid	1 Plus sieved	No	0			6Dec2013
PRI13-002	Surface Solid	1	No	0			7Dec2013
PRI13-003	Surface Solid	1	Yes	1	PRI13-03-SS01-120613-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 13.	6Dec2013
PRI13-004	Surface Solid	1	No	0			7Dec2013
PRI13-005	Surface Solid	1	No	0			7Dec2013
PRI13-006	Surface Solid	1 Plus sieved	No	0			7Dec2013
PRI13-007	Surface Solid	1	No	0			7Dec2013
PRI13-008	Surface Solid	1 Plus sieved	No	0			6Dec2013

Table 1
Sample and Split Sample Summary
US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI13-009	Surface Solid	1 Plus sieved	No	0			6Dec2013
PRI13-010	Surface Solid	1	No	0			5Dec2013
PRI13-011	Surface Solid	1	No	0			5Dec2013
PRI13-012	Surface Solid	1	Yes	1	PRI13-12-SS01-120613-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 13. Located in raised, vegetated area of PRI and has slightly different surface soil type from other split sample location.	6Dec2013
PRI13-013	Surface Solid	1 Plus sieved	No	0			5Dec2013
PRI13-014	Surface Solid	1	No	0			5Dec2013
PRI Area 14 – Buffer Area South							
PRI14-001	Surface Solid	1	No	0			2Dec2013
PRI14-002	Surface Solid	1	No	0			3Dec2013
PRI14-003	Surface Solid	1 Plus sieved	No	0			4Dec2013
PRI14-004	Surface Solid	1	No	0			4Dec2013
PRI14-005	Surface Solid / Subsurface Solid / Surface Water	1 / 3 / 1	Yes	1 / 1 / 1	PRI14-05-SS01-121113-ES01 and PRI14-05-SB02-2-121613-ES01 (perchlorate) and PRI14-05-SB03-4-121613-ES01 (remaining analyses) and PRI14-05-SW01-021114-ES01	To get a minimum of two split samples of surface solids from PRI Area 14. To get a minimum of one split sample of subsurface solids from each boring. To get approx. 20% split samples of surface water from PRI Area 17.	~~4Dec2013~~ 11Dec2013 16Dec2013 11Feb2014

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Sample and Split Sample Summary
US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI14-006	Surface Solid / Surface Water	1 / 2 Plus sieved	Yes	1	PRI14-06-SS01-120313-ES01 (no VOC) and PRI14-06-SS01-121113-ES01 (VOC only)	To get a minimum of two split samples of surface solids and surface water from PRI Area 14 and to target a saturated solids sample (which includes VOCs analysis).	3Dec2013 11Dec2013: VOC resample 20Nov2013
PRI14-007	Surface Solid	1	No	0			3Dec2013 11Dec2013: VOC resample
PRI14-008	Surface Solid / Surface Water	1 / 1	Yes	1	PRI14-08-SW01-111913-ES01	To get approx. 20% split samples of surface water from PRI Area 17.	2Dec2013 11Dec2013: VOC resample 19Nov2013
PRI14-009	Surface Solid	1 Plus sieved	No	0			2Dec2013
PRI14-010	Surface Solid	1 Plus sieved	No	0			2Dec2013
PRI14-011	Surface Solid	1	No	0			2Dec2013
PRI14-012	Surface Solid	1	No	0			26Nov2013
PRI14-013	Surface Solid / Surface Water	1 / 1 Plus sieved	Yes	1	PRI14-13-SW01-111913-ES01	To get approx. 20% split samples of surface water from PRI Area 17.	26Nov2013 19Nov2013
PRI14-014	Surface Solid	1	No	0			26Nov2013
PRI14-015	Surface Solid	1	No	0			26Nov2013
PRI Area 15 – Buffer Area West							
PRI15-001	Surface Solid	1	No	0			23Nov2013
PRI15-002	Surface Solid	1	Yes	1	PRI15-02-SS01-112413-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 15.	24Nov2013
PRI15-003	Surface Solid	1	No	0			23Nov2013
PRI15-004	Surface Solid	1	No	0			24Nov2013
PRI15-005	Surface Solid	1	No	0			22Nov2013

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US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI15-006	Surface Solid	1	No	0			23Nov2013
PRI15-007	Surface Solid	1	No	0			22Nov2013
PRI15-008	Surface Solid	1	No	0			13Jan2014
PRI15-009	Surface Solid	1	No	0			23Nov2013
PRI15-010	Surface Solid	1	Yes	1	PRI15-10-SS01-112413-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 15.	24Nov2013
PRI15-011	Surface Solid	1	No	0			23Nov2013
PRI15-012	Surface Solid	1	No	0			24Nov2013
PRI15-013	Surface Solid	1	No	0			24Nov2013
PRI15-014	Surface Solid	1	No	0			24Nov2013
PRI Area 16 – Lakeside Mountain Buffer Area							
PRI16-001	Surface Solid	1	No	0			22Nov2013
PRI16-002	Surface Solid	1	No	0			22Nov2013
PRI16-003	Surface Solid	1	No	0			20Nov2013
PRI16-004	Surface Solid	1	Yes	1	PRI16-04-SS01-112013-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 16.	20Nov2013
PRI16-005	Surface Solid	1	No	0			20Nov2013
PRI16-006	Surface Solid	1	No	0			19Nov2013
PRI16-007	Surface Solid	1	No	0			19Nov2013
PRI16-008	Surface Solid	1	Yes	1	PRI16-08-SS01-112013-ES01	To get a minimum of two split samples of surface solids from different areas in PRI Area 16.	20Nov2013
PRI16-009	Surface Solid	1	No	0			19Nov2013
PRI16-010	Surface Solid	1	No	0			19Nov2013
PRI16-011	Surface Solid	1	No	0			23Nov2013
PRI16-012	Surface Solid	1	No	0			19Nov2013

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US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PRI16-013	Surface Solid	1	No	0			22Nov2013
PRI16-014	Surface Solid	1	No	0			21Nov2013
PRI Area 17 – Site-Wide Water (Only groundwater sample locations presented below; surface water sample locations presented in respective PRI Area)							
LF-01	Groundwater	1	Yes	1	LF-01-01-021714-ES01	To get approx. 20% split samples of groundwater from PRI Area 17.	5Dec2013: redeveloped 17Feb2014: sampled
LF-03	Groundwater	1	Yes	1	LF-03-01-021714-ES01	To get approx. 20% split samples of groundwater from PRI Area 17.	4Dec2013: redeveloped 17Feb2014: sampled
MW-04A	Groundwater	1	No	0			5Dec2013: redeveloped 5Feb2014: sampled
MW-05A	Groundwater	1	No	0			4Dec2013: redeveloped 7Feb2014: sampled
MW-06	Groundwater	1	No	0			5Dec2013: redeveloped 7Feb2014: sampled
MW-07	Groundwater	1	No	0			5Dec2013: redeveloped 6Feb2014: sampled
MW-08A	Groundwater	1	No	0			6Dec2013: redeveloped 18Feb2014: sampled
MW-08B	Groundwater	1	No	0			6Dec2013: redeveloped 18Feb2014: sampled
PZ-01	Groundwater	1	No	0			24Jan2014: redeveloped 4Feb2014: sampled
PZ-04 ~~and/or PZ-27~~	Groundwater	1	Yes	1	PZ-04-01-021314-ES01	To get approx. 20% split samples of groundwater from PRI Area 17.	2Dec2013: redeveloped 13Feb2014: sampled
PZ-06	Groundwater	1	No	0			4Dec2013: redeveloped 31Jan2014: sampled
PZ-08	Groundwater	1	No	0			3Dec2013: redeveloped 5Feb2014: sampled
PZ-10	Groundwater	1	No	0			3Dec2013: redeveloped 4Feb2014: sampled
PZ-12	Groundwater	1	No	0			4Dec2013: redeveloped 4Feb2014: sampled
PZ-16	Groundwater	1	No	0			3Dec2013: redeveloped 3Feb2014: sampled

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US Magnesium NPL Site

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Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
PZ-18	Groundwater	1	No	0			2Dec2013: redeveloped 3Feb2014: sampled
PZ-22	Groundwater	1	No	0			5Dec2013: redeveloped 3Feb2014: sampled
PZ-24	Groundwater	1	No	0			4Dec2013: redeveloped 7Feb2014: sampled
PZ-26	Groundwater	1	No	0			3Dec2013: redeveloped 5Feb2014: sampled
MW-13A MW-13B	Groundwater	1	No	0			4Dec2013: installed 9Dec2013: developed 4Feb2014: sampled
MW-14 (shallow is not to be installed)	Groundwater	1	No	0			5Dec2013: installed 10Dec2013: developed 5Feb2014: sampled
MW-15A MW-15B	Groundwater	1	No	0			5Dec2013: installed 9Dec2013: developed A 10Dec2013: developed B 5Feb2014: sampled
MW-16	Groundwater	1	No	0			13Jan2014: Installed *8May2014:Well inundated by wastewater – unable to sample*
MW-17	Groundwater	1	No	0			9Dec2013: installed 16Dec2013: developed 5Feb2014: sampled
MW-18	Groundwater	1	Yes	2	MW-18-01-021314-ES01 and MW-18-01-021314-ES02	To get approx. 20% split samples of groundwater from PRI Area 17. Field duplicate location selected randomly to meet QC requirement of 10 % frequency for aqueous samples.	3Dec2013: installed 6Dec2013: developed 13Feb2014: sampled
MW-19A MW-19B	Groundwater	1	Yes	2	MW-19A-01-02142014-ES01 and MW-19B-01-02142014-ES01	To get approx. 20% split samples of groundwater from PRI Area 17.	9Dec2013: installed 11Dec2013: developed A 16Dec2013: developed B 14Feb2014: sampled

Table 1
Sample and Split Sample Summary
US Magnesium NPL Site

Black Font: Surface Soil Samples | Brown Font: Subsurface Soil Samples | Blue Font: Water Samples

Sample Location ID	Sample Media and Location	Number of Samples	EPA Split Sampling Location	Number of Split Samples	EPA Split Sample Number	Rationale for EPA Split Sample Location	Date of Sample Collection
MW-20A MW-20B	Groundwater	1	No	0			6Dec2013: installed 11Dec2013: developed 31Jan2014: sampled
SG-1 through SG-5	**Staff Gauges**	**0**					11Dec2013: installed all 31Jan2014: re-installed SG-1

Table 2
Split Sample and QC Sample Summary
US Magnesium NPL Site

Media	Number of Field Samples	Number of Split Samples	Percentage of Split Samples	Number of Split QC Samples	Percentage of Split QC Samples
Surface Solids	145	24	17	2	6
Subsurface Solids	34	9	27 *		
Surface Water	16	8	50	1	7
Groundwater	31	6	19		

Notes:

* A minimum of one solid sample was collected from each of the subsurface borings.

QA/QC = quality assurance/quality control

Table 3
EPA Laboratory Identification
US Magnesium NPL Site

Laboratory Name	Contract Mechanism	Solids Analyses	Aqueous Analyses
KAP Technologies, Inc.	EPA Analytical Program Laboratory (CLP)	VOCs SVOCs PAHs	VOCs SVOCs PAHs
TechLaw, Inc.	EPA Analytical Program Laboratory (ESAT)	pH	TDS
Southwest Research Institute	EPA Analytical Program Laboratory (CLP)	PCBs PCDD/PCDF	PCBs PCDD/PCDF
Southwest Research Institute	PWT Subcontracted Laboratory	Perchlorate	Perchlorate Anions
ALS Environmental (Salt Lake City)	PWT Subcontracted Laboratory	Metals (CN, Hg) TOC	Metals (CN, Hg) TOC Alkalinity Haloacetic Acids
ALS Environmental (Rochester, NY)	PWT Subcontracted Laboratory	none	Hexavalent Chromium

Notes:

CLP = Contract Laboratory Program
ESAT = Environmental Services Assistance Team
VOCs = Volatile organic compounds
SVOCs = Semi-volatile organic compound
PAHs = Polynuclear aromatic hydrocarbon
TDS = Total dissolved solids
PCBs = Polychlorinated biphenyls
PCDDs/PCDFs = Polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
TOC = Total organic carbon
CN = Cyanide
Hg = Mercury

Table 4
Phase 1A RI SAP Completed and Approved Field Modification Forms
US Magnesium NPL Site

Document Tracking Number	Brief Description of Modification	Date Prepared	Date Approved
14C-1-1	PRI14-013 – Location Change	19 Nov 2013	19 Nov 2013
14C-1-2	PRI14 – Request use of silicone tubing for sampling	19 Nov 2013	19 Nov 2013
14C-1-3	PRI14-013 – Request use of a pole-mounted dipper to sample	25 Nov 2013	25 Nov 2013
14C-1-4	MW-18 – Change of screen interval	3 Dec 2013	3 Dec 2013
14C-1-5	MW-18 – Request use of bentonite chips and "Quickrete" to seal well	3 Dec 2013	4 Dec 2013
14C-1-6	MW-14 – Request removal of MW-14A, request change in screened interval	5 Dec 2013	5 Dec 2013
14C-1-7	MW-20 – Change screened interval, request to pre-pack well	6 Dec 2013	6 Dec 2013
14C-1-8	PRI13-003 – Utilized one additional auger hole	6 Dec 2013	6 Dec 2013
14C-1-9	MW-19B – Request to set MW19B using a pre-pack well	9 Dec 2013	9 Dec 2013
14C-1-10	PRI12-010 – Utilized two additional auger holes	10 Dec 2013	10 Dec 2013
14C-1-11	PRI14-005 – Utilized two additional auger holes	11 Dec 2013	11 Dec 2013
14C-1-12	PRI10-003 – Utilized two additional auger holes	12 Dec 2013	12 Dec 2013
14C-1-13	PRI9-013 & PRI9-014 – Utilized four and one additional auger holes, respectively	20 Dec 2013	20 Dec 2013
14C-1-14	PRI9-011 & PRI9-002 – Utilized eight and four additional auger holes, respectively	6 Jan 2014	6 Jan 2014
14C-1-15	PRI2-003 – Utilized one additional auger hole	8 Jan 2014	8 Jan 2014
14C-1-16	MW16 – Well construction modification	13 Jan 2014	13 Jan 2014
14C-1-17	PRI15-008 – Location change	13 Jan 2014	13 Jan 2014
14C-1-18	MW16 – Bailer lowered by hand instead of rig, surged by hand, well developed using a peristaltic pump and tubing intake above screened interval	14 Jan 2014	16 Jan 2014
14C-1-19	Change pumping rates	5 Feb 2014	6 Feb 2014
14C-1-20	PRI18-005 A & B – Alternate procedure to obtain sample	9 May 2014	12 May 2014
14C-1-21	PRI2 – Boring locations adjusted	9 May 2014	12 May 2014

FIGURES

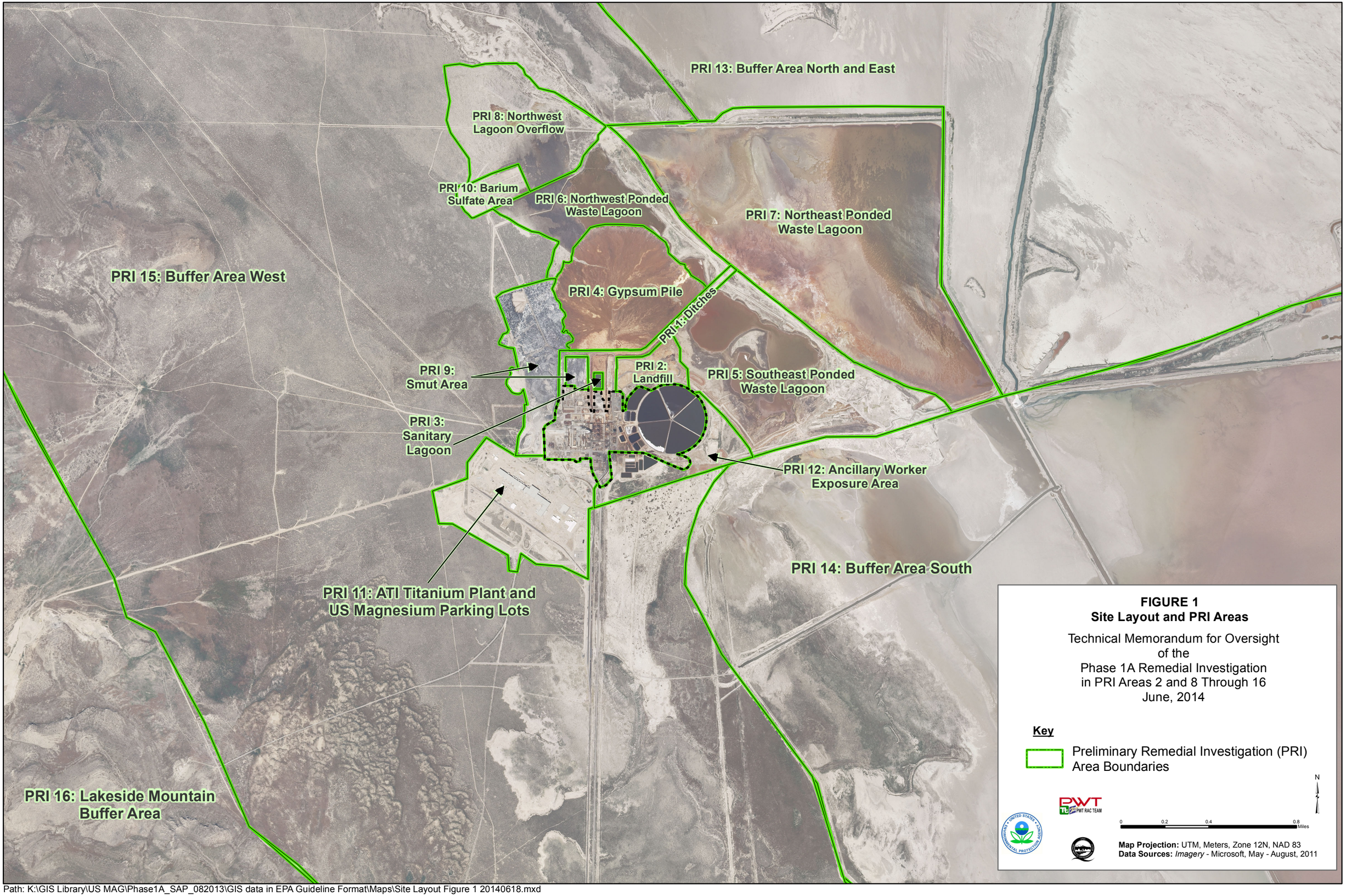

FIGURE 1
Site Layout and PRI Areas

Technical Memorandum for Oversight
of the
Phase 1A Remedial Investigation
in PRI Areas 2 and 8 Through 16
June, 2014

Path: K:\GIS Library\US MAG\Phase1A_SAP_082013\GIS data in EPA Guideline Format\Maps\Site Layout Figure 1 20140618.mxd

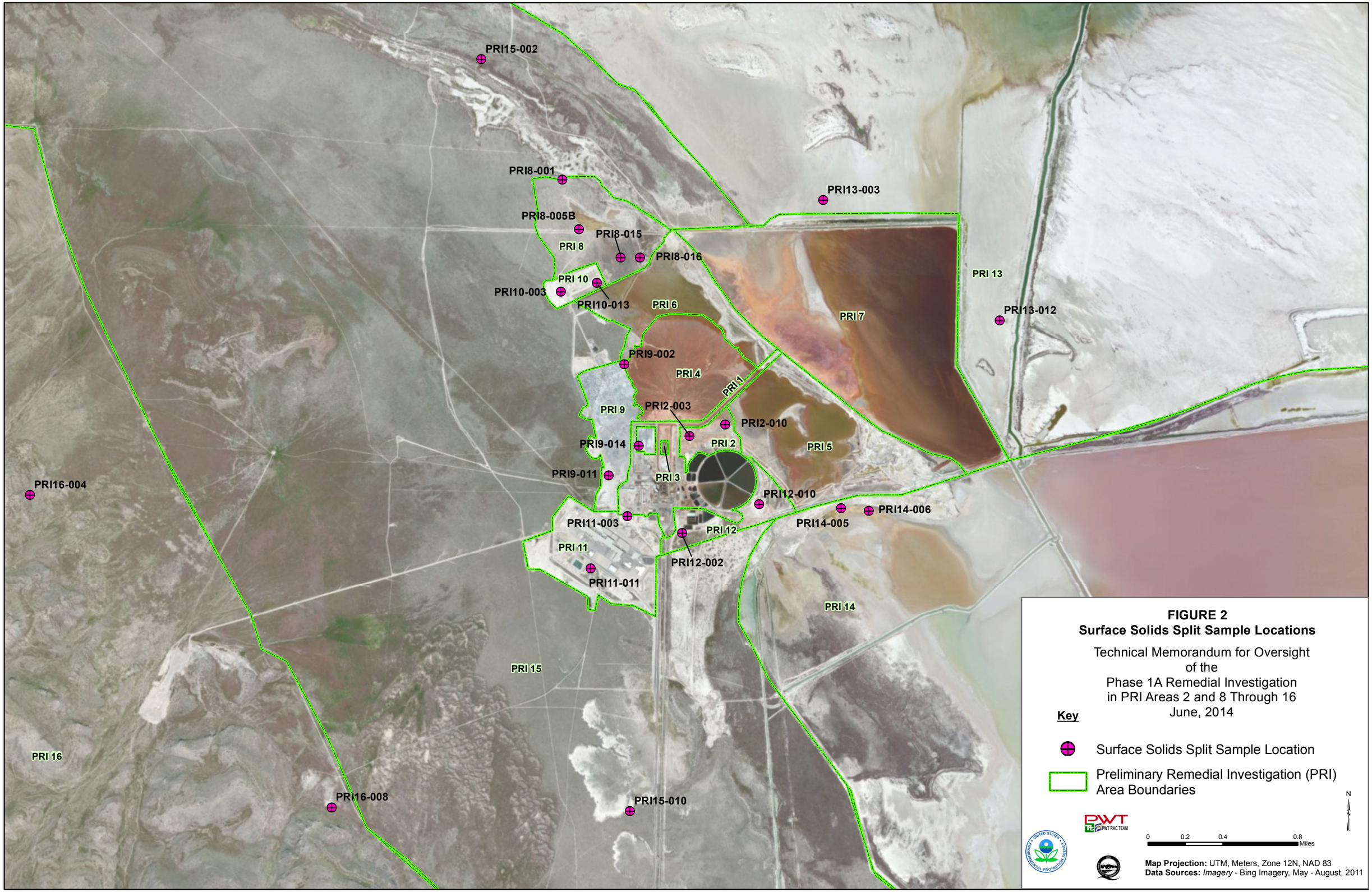

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FIGURE 3
Subsurface Solids Split Sample Locations
Technical Memorandum for Oversight
of the
Phase 1A Remedial Investigation
in PRI Areas 2 and 8 Through 16
June, 2014

Path: K:\GIS Library\US MAG\Phase1A_SAP_082013\GIS data in EPA Guideline Format\Maps\Soil Collection Figure 3 20140618.mxd

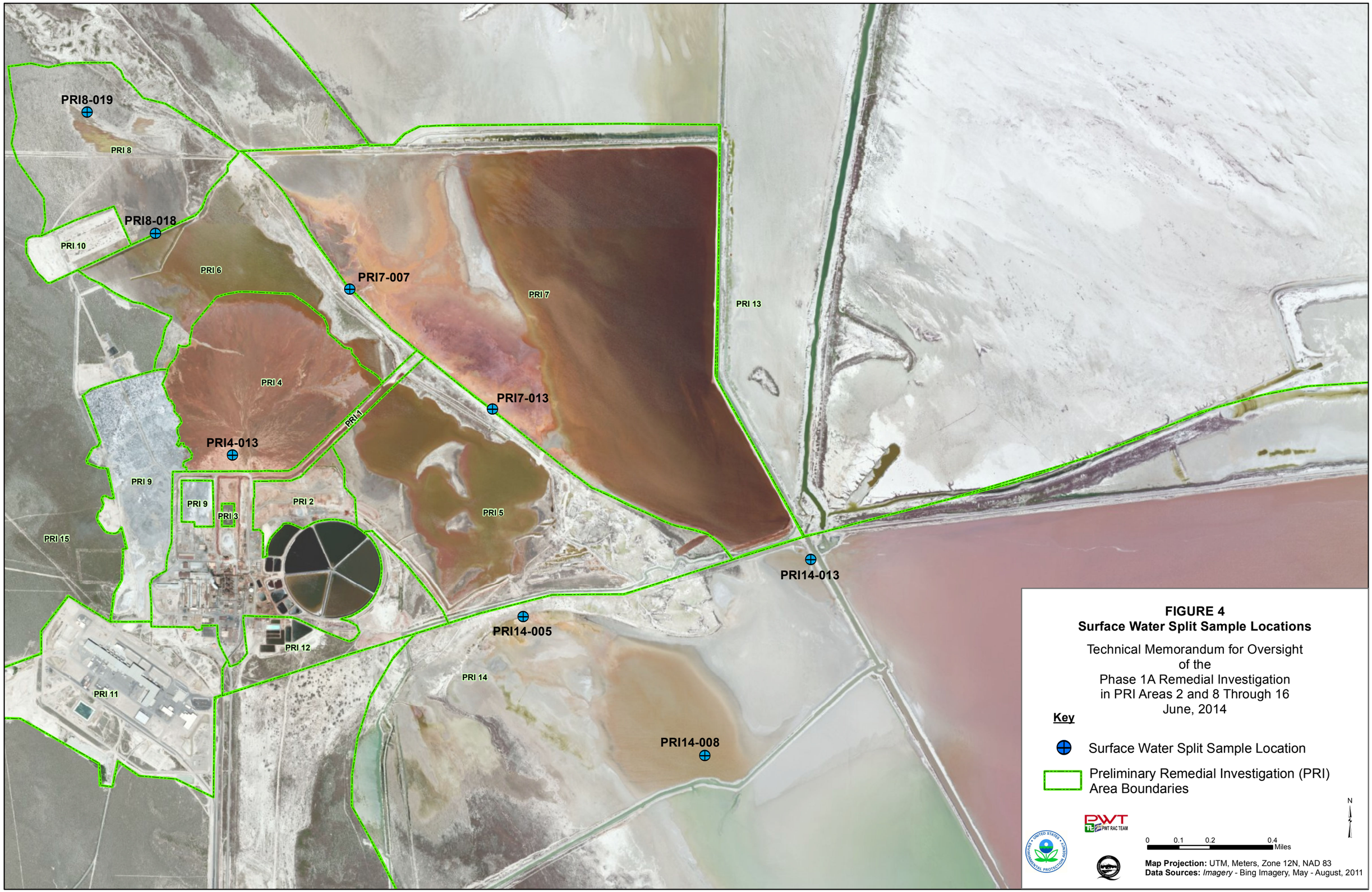

FIGURE 4
Surface Water Split Sample Locations

Technical Memorandum for Oversight
of the
Phase 1A Remedial Investigation
in PRI Areas 2 and 8 Through 16
June, 2014

Path: K:\GIS Library\US MAG\Phase1A_SAP_082013\GIS data in EPA Guideline Format\Maps\Surface Water Collection Figure 4 20140618.mxd

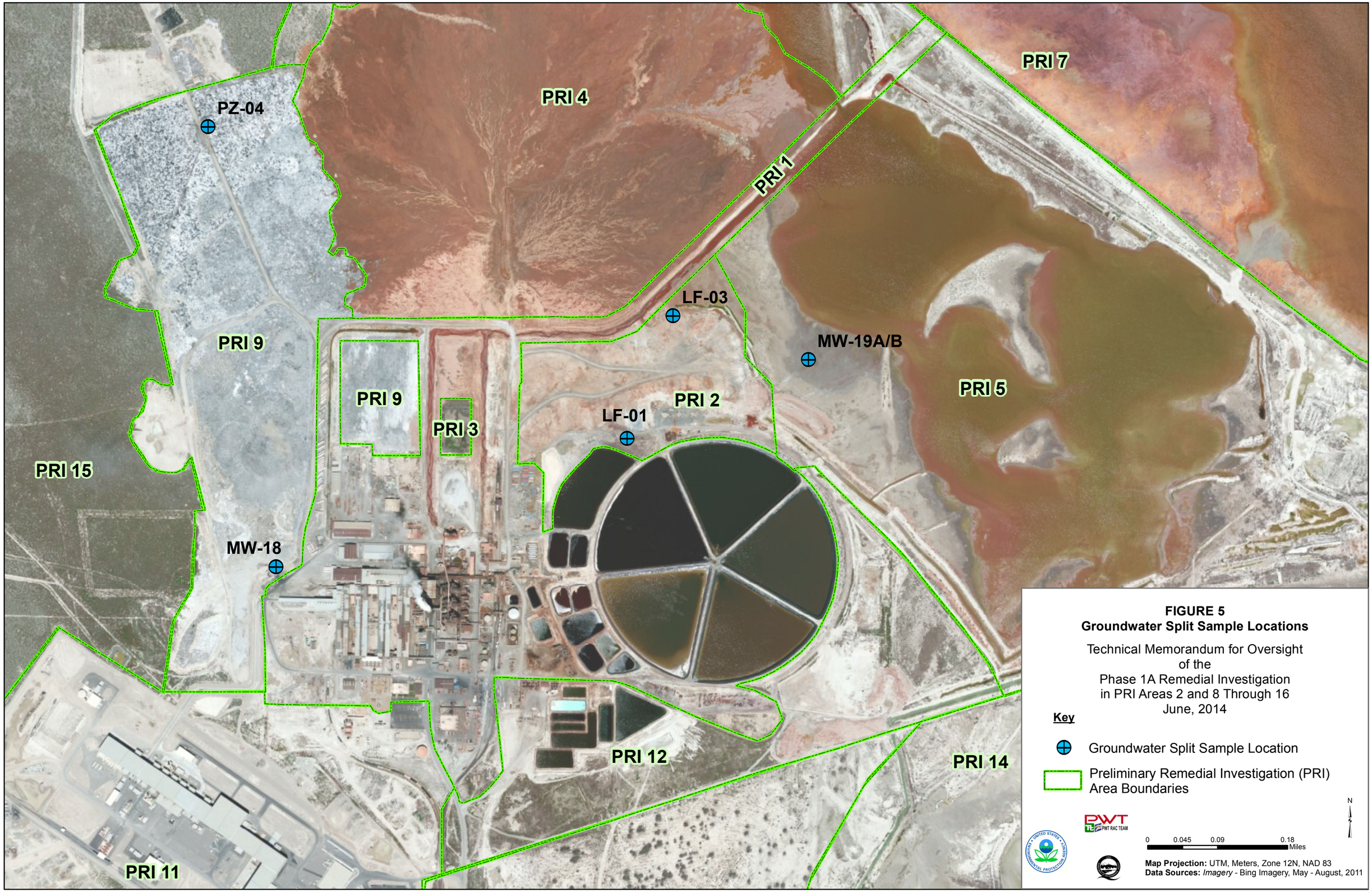

FIGURE 5
Groundwater Split Sample Locations

Technical Memorandum for Oversight
of the
Phase 1A Remedial Investigation
in PRI Areas 2 and 8 Through 16
June, 2014

Key

Groundwater Split Sample Location

Preliminary Remedial Investigation (PRI) Area Boundaries

Path: K:\GIS Library\US MAG\Phase1A_SAP_082013\GIS data in EPA Guideline Format\Maps\Groundwater Collection Figure 5 20140618.mxd

APPENDIX A
FIELD NOTES (SCANNED LOG BOOKS)

AARON BAIRD

Logbook

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Projects
US Magnesium NPL Site
Rowley, Utah
WAIRO

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US Mag Phase IA RI Oversight 10/4/13

Arrived on site at 8:15am
Met with Kevin Lundmark and ERM field team.
Had H&S meeting and signed meeting attendance form.
Weather is windy and cold, winds S-SE
2 2-person ERM field teams - one in PRI 14 and one in PRI 13
Went with PRI 14 team
ERM used Trimble GPS unit to mark sample loc. PRI14-001 with a flagged stake. Location is on the dirt road that parallels the skull creek diversion canal. Soil is a dry silt loam with some gravel at the surface.
Marked PRI14-002 with a flagged stake and then took 20 paces (~20 meters) to the south to stake sieving location, which was in same soil type, a clayey former ponded area that was moist. Hand augered to 6" at 5 points in a star pattern.

10/4/13

Soil was too stiff and clayey to press through .25" sieve. Didn't notice any pieces that wouldn't pass through sieve if dry. Bagged sample.

Cryptobiotic soil noticed on way to sample location.

Seems to be two major surface soil types in PRI 14 - clayey former ponded areas and slightly raised sandy loam/gravelly loam areas. There is no vegetation in the lower formerly ponded areas and vegetation in the raised areas.

ERM doesn't have a sieve SOP.

Kevin indicated that sample loc. were selected randomly and no consideration was given to soil type.

Marked PRI14-003 with flagged stake took ~10 paces N of staked loc. to collect sieve sample in same soil type. Surface has ~.5" salt crust. Saturated under salt layer and pools of standing water nearby. Could push auger into soil once it broke through salt layer. Soil was a silt loam w/some clay. Some had poor recovery.

10/4/13

Soil was black and had strong organic odor. All but some solid chunks from salt surface layer passed through 0.25" sieve. Soil was very saturated.

Chlorine meter has readings steady at 0.1 ppm. Directly south and downwind of PRI 5 ponded waste lagoon.

Sieving locations were selected randomly, 2 per quadrant

Marked PRI-012 with flagged stake in dry, fine-med. grained sand, some small vegetation present. Area slightly raised above area to west (more recently submerged area). No sieve sample here.

Marked PRI-013 with flagged stake in moist, fine-med. grained sand with some gravel at surface. Paced ~20 meters south for sieve location. First auger 100% sand, second was 90% silt/clay but no difference visible at surface.

6" x 3.5" auger bucket used

Other auger holes mostly sand with some clay layers.

1 kilogram is sample volume requirement for physical analysis of sieve samples.

10/4/13

Marked PRI13-014 location w/ stake, then paced ~20 meters S in same surface soil type to collect sieve sample. Silty clay with some sand, evaporate pieces pulled from some of the auger locs. Much more fines in -14 than -13 even though surface looks the same. Soil is moist. In area traversed by striping per ATV so soil is disturbed at surface.

The other team marked all other locations in PRI13 and collected the sieve samples

Wind still S w/ temps in the low 50s
0 ppm on chlorine meter in PRI13

Beetle observed by PRI13-014 and jack rabbit observed by PRI14-003. Ravens observed flying overhead in both.

Got to ERM field trailer to unload and Cl_2 readings reached 0.5 ppm so team donned respirators.
Departed site at 3:45pm

US Mag Phase 1A RI Oversight 11/18/13

Picked up sampling supplies from ALS
Attended US Mag contractor safety orientation and signed attendance form. Meeting presented by Bruce McCormick of US Mag. Kevin, Isaiah, and Darren present from ERM.
0.9 ppm is US Mag's action level for chlorine - see RMA-28 dated 1/13 for language.
Bruce requested my respirator fit test and physical paperwork, which I emailed him later that day.
ERM indicated they would have 2 field teams going until Thanksgiving - soil and surface water sampling teams, and then 3 teams (+drillers) after Thanksgiving. ERM said surface water sampling will start in PRI-14.
They expect to collect 3-4 surface water samples/day and are hoping to complete all surface water sampling before Thanksgiving.
They expect to collect about 4 soil samples per day and will start in PRI-16.
Dropped sampling supplies off at office trailer.

11/19/13 US Mag Phase IA RI Oversight

Arrived on site at 8:00am, donned PPE, and met ERM field crew at office trailer

ERM water sampling team consists of Isaiah and Darren, accompanied by Kevin Lundmark, and the soil sampling team consists of Chris and Trent.

Went over scope - soil sampling in PRI-16 and surface water sampling in PRI-14.

ERM tested Tygon tubing with their Geotech peristaltic pump. Tygon tubing is too rigid and not working with pump.

ERM requested permission to use silicone tubing at the pump w/Tygon before and after. A field mod. approval form was prepared and I signed it.

Went with water sampling team to PRI-14

Had H&S tailgate meeting.

Using Industrial Scientific iBRiD MX6 multigas (PID, O_2, CO, HCl, Cl_2) meter - no chlorine detected at PRI-14.

Weather is partly cloudy and ~50°F w/ light winds.

Set up at surface water sample location PRI14-013.

11/19/13

The water at the original staked location is too shallow (<1") to sample.

ERM requested permission to move sample location PRI14-013 ~200' N in the nearest surface water deep enough to sample - water depth ~2"

A Field Mod. Approval Form was prepared and I signed it.

Old stake was removed and new location was staked and GPS'd.

ERM set up at sampling location exactly as desc. in surface water sampling SOP.

Gave ERM cooler full of all sample contain. and ERM filled like for like analysis bottles concurrently through the splitter.

VOC bottles were collected first not using splitter, then filtered samples through splitter (change from SOP, but seen as an improvement), and then all other bottles.

Collected surface water sample PRI14-08-SW01-111913-ES01 - see field data sheet.

ERM unable to use 0.2 micron filter for their Hex. Chrom. sample due to clogging.

All sampling procedures done according to the SOP.

11/19/13

ERM (Kevin) not willing to handle field testing and buffering/preservation for EPA split samples.

Left test strips and preservatives in office trailer; therefore unable to immediately preserve samples. Also, realized that I should have labeled the sample containers because the aliquots collected in the same type of container (ex. 1L amber glass) may get mixed up and therefore won't exactly be like for like. Field filtered aliquots ~~with~~ AB and aliquots with unique sample containers stayed like for like.

Set up at surface water sample location PRI14-008. Gave ERM cooler full of all sample containers (this time labeled).

ERM used boat and waders to access sample location.

ERM filled sample containers and did all field testing and preservation at the boat. I did not accompany ERM to sample location, I observed from shore.

ERM unable to buffer CN to pH>12 at the boat, so they said they would try again at

11/19/13

their office trailer. Because it was already 5:15pm I did not go back to ERM's trailer. I left from there to go to my office trailer to process samples.

Measured pH of PRI14-013 Hex. Chrom. and CN aliquots, both had pH of 6 (measured with pH test strips). Added 80 drops of NaOH to Hex. Chrom. bottle (500mL) to bring pH to 9.

Added ~550 drops of NaOH to diss. CN bottle (1L), bottle filled to top, pH at 10, stopped. Added ~600 drops of NaOH to total CN bottle, bottle filled to top, pH at 10, stopped.

Measured pH of PRI14-008 Hex. Chrom. and CN aliquots, both had pH of 6.

Added 150 drops of NaOH to Hex. Chrom. sample to bring pH to 9.

Added ~550 drops of NaOH to diss. CN bottle, bottle filled to top, pH at 9, stopped.

Added ~600 drops of NaOH to total CN bottle, bottle filled to top, pH at 10, stopped.

$(NH_4)_2SO_4$ granules from pre-preserved bottle not dissolved in Hex. Chrom. bottles. ~~Particu~~ AB Precipitate observed in all bottles.

11/19/13
Unable to make FedEx drop by 7:30pm
Left samples on ice in office trailer.
ERM soil sampling team collected
PRI16-006, -007, -009, -010, and -012.

US Mag Phase 1A RI Oversight 11/20/13

Arrived on site at 8:00am, donned PPE, and met ERM field crew at their office trailer. Weather is cloudy and cool, with scattered showers expected.
Heading out with ERM soil sampling team, consisting of Chris and Trent, to PRI-16.
ERM water sampling team going to PRI-14.
Drove out to soil sample location PRI16-004.
Had H&S tailgate meeting.
ERM collected soil from 5 locations in a star pattern around the sample loc. stake with a flat bottom scoop, pushed soil through 1/4" sieve, and onto a large steel tray, and brought back to truck to homogenize. Scoops were ~4"x4" and 2" deep; ERM did not measure the size of the scoops, just used the 4" wide flat bottom trowel to gauge size. All procedures conducted in accordance with the SOP.
Asked ERM about selection of the 5 scoop locations and they said that the locations are selected randomly but biased to avoid rocky locations. No preference given to areas of exposed dirt vs. vegetated areas.

11/20/13

ERM using one 4 ounce jar for PCBs, one 4 ounce jar for perchlorate (both methods from same jar), and two 8 ounce jars for everything else.

Collected soil sample PRI16-04-SS01-112013-ES01 - see field data sheet.

From there we went to soil sample location PRI16-008. There was grass on the surface of many of the scoop locations with dense roots. ERM was very thorough in trying to remove all the soil from the roots.

I told ERM prior to collecting scoops that I wanted to get additional sample volume for MS/MSD from this location, and when asked about their approach to get more volume they said it was to expand the existing 5 aliquot locations rather than to create additional location. However, even with a split with MS/MSD volume, the scoops did not need to be expanded. Scoops were ~4"x6" and 2" deep and there was ample sample volume. Collected soil sample PRI16-08-SS01-112013-ES01 - see field data sheet.

11/20/13

Headed back to office trailer to package samples.

Samples shipped to ALS-NY, SuRI, & KAP.

Will deliver ALS-SLC samples tomorrow morning.

ERM soil sampling team also collected PRI16-003 and -005.

11/21/13 US Mag Phase IA RI Oversight

Dropped ~~of~~ 11/19 and 11/20 samples off at ALS-SLC.

Arrived onsite around 8:30am.

Met ERM water sampling team, Isaiah and Darren, at office trailer.

Had H&S meeting in trailer.

Weather is snowing, cold, and windy.

Went to Sanitary Lagoon to assess the presence of surface water. I walked the perimeter of the lagoon and ERM guys walked all through it and no surface water was observed.

From there we went to Gypsum Pile to assess the surface water locations.

There is no water flowing out of the slurry pipe, and the trench below the slurry pipe is dry for ~100' and then water is pooled for about another 100' and then dammed. PRI4-013 surface water sample location will need to be moved N to the pooled area.

There was no surface water at sample loc. PRI4-008

From there we went to take a look at sample loc. PRI14-005. There is

11/21/13

thin (<1") surface water at the staked location but no hole at seep and not enough water to sample. ERM attempted to dig a hole with a shovel but the soft sediment continues to cave in the hole. Assessed alternative locations and discussed options.

Received email from Kevin at ALS-SLC stating that the TOC samples should have been collected in 40mL VOA vials w/ H_2SO_4, rather than the 500mL HDPE bottles I used on 11/19. ERM using 250mL HDPE bottles for TOC, unpreserved, and 500mL HDPE bottles stated in SAP WS#19. Also, using 500mL HDPE for CN, rather than 250mL HDPE stated in SAP.

Went to office trailer to get VOAs for TOC and ERM went to their office trailer to prepare for sampling PRI-7.

There was a strong southerly wind and could smell chlorine at the Muskrat Fire Station.

It stopped snowing and we went to collect surface water sample at PRI7-007.

There is a nice flowing seep at PRI7-007

11/21/13

that is ~13" deep. Collected surface water sample PRI7-07-SW01-112113-ES01 see field data sheet.

New Solinst peristaltic pump working well with the 1/2" Tygon tubing throughout.

Due to cold wind weather, we returned to ERM office trailer to test and preserve samples.

Initial pH of CN samples was 5, so ERM added 50mL NaOH to their 500mL sample bottle to bring the pH to 10.3 (using dummy bottle with same volume and Horiba to measure pH) and stopped there.

Since ERM is not preserving EPA's samples, instructed to watch what ERM does to their sampler and do exactly the same.

EPA CN bottles are 1L, so 100mL NaOH was added to each 1L CN bottle which brong ht the pH to 12. NaOH was added with 5mL disposable pipets and ERM using graduated beaker or dropper to measure NaOH, so the volume ERM is adding is likely more accurate than ours.

11/21/13

Returned to office trailer to process samples.

Samples shipped to ALS-NY, SwRI, & KAP. Will deliver ALS-SLC samples tomorrow morning. PCB, PCDD/PCDF, pH, and TOS samples kept on ice in coolers in the office trailer - still waiting for CLP & ESAT lab assignments.

ERM soil sampling team collected PRI16-014.

11/22/13 US Mag Phase 1A RI Oversight

Dropped off samples at ALS-SLC.
Arrived on site around 8:15am.
Met ERM water sampling team, Isaiah and Darren, at office trailer.
Had H&S meeting in trailer. Weather is clear, cold, and windy.
Headed out to surface water sample location PRI7-014, which was not selected for an EPA split sample. Location appears to be an extensive seep based on the water volume present east of it, but it was not very deep and not flowing as much as some of the seeps to the north.
ERM collected surface water sample at the PRI7-014 location.
Set up at surface water sample location PRI7-013. Collected surface water sample PRI7-13-SW01-112213-ES01 - see field data sheet. Collected MS/MSD volume for all analyses.
Went back to ERM field trailer to test and preserve samples.
Returned to office trailer to process samples.
Samples shipped to ALS-NY, SwRI, and

11/22/13

KAP. Will deliver ALS-SLC samples Monday.
PCB, PCDD/PCDF, pH, and TDS samples kept on ice in coolers in the trailer. - Still waiting for CLP/ESAT lab assign.
ERM soil sampling team collected PRI15-005 and -007, and PRI16-001, -002, and -013.

11/24/13 US Mag Phase 1A RI Oversight

Arrived on site at 8:00am

Met ERM soil sampling team, Isaiah and Trent, at office trailer.

ERM collected soil samples PRI15-001, -006, -009, and -011, and PRI16-011 (PRI16 soil sampling now complete) yesterday (Saturday, 11/23/13)

Had H&S meeting in trailer

Weather is partly cloudy, cold, light wind

Drove out to soil sample location PRI15-002

Evidence of cattle grazing in area.

ERM collected soil from 5 4"x4" and 2" deep locations with a flat-bottom scoop. All procedures conducted in accordance with the SOP.

Collected soil sample PRI15-02-SS01-11/24/13-ES01 - see field data sheet.

From there we went to soil sample loc. PRI15-004. Strong odor in the area but no readings on the multi-gas meter. Slight northerly wind. Encountered jack rabbit.

ERM collected soil sample PRI15-04-SS01-112413 - no EPA split at this location.

11/24/13

From there we went to soil sample loc. PRI15-010.

Collected soil sample PRI15-10-SS01-112413-ES01 - see field data sheet.

ERM expects to collect the remaining soil samples in PRI15 (-003, -008, -012, -013, and -014) today.

Headed back to office trailer to package samples.

BLM locked our lock out of the daisy chain in the second gate but was able to go through unlocked man gate to access trailer. Left message for Jared Redington of BLM to let him know.

It's Sunday, so no samples shipped, left on ice in office trailer.

11/25/13 US Mag Phase 1A RI Oversight

Dropped 11/22 and 11/24 samples off at ALS-SLC.

Arrived onsite at 8:30am

Weather is clear with temps in mid 30s and calm wind.

ERM soil sampling team, Chris and Trent, starting sampling in E side of PRI14 and working W, and will not be sampling the PRI14 soil sample locs. targeted for EPA splits.

ERM did not collect soil sample PRI15-008 on Sunday (11/24/13) because it is located on ATI property and ERM doesn't have an access agreement with ATI. All other PRI15 soil sample locations have now been collected.

ERM surface water sampling team, Isaiah and Kevin, plan to collect PRI8-005, and PRI4-013.

Went with surface water sampling team to PRI8. The road that runs E-W that splits PRI8 was flooded from surface water moving N through PRI8. ERM tested water on road with pH test strip and it had a pH of 1.

11/25/13

Drove east and then N to go around flooded road and access the sample loc. from the N.

The PRI8-005 location is at the NW extent of the surface water.

ERM tested water with pH test strip and it had a pH of 5.5.

Sample collected from a deeper pool on the N side of the stake.

Sinkholes observed at the NW perimeter of the formerly flooded area and surface soils were damp.

Intake tubing broke loose from PVC pipe so it was zip-tied to the stake.

No chlorine readings in PRI8.

Returned to office trailer.

Kevin went with David Gibby to show him where they needed earthwork for the drilling locations.

Went to PRI4, the gypsum slurry pipe outfall is flowing from the subsurface and creating a nice pool at the source to sample from. Water flowing into PRI6.

Strong chlorine smell while driving up

to gypsum pile so the team donned respirators before exiting vehicles.
Although we could smell chlorine the chlorine meters were reading 0 ppm HCl at 0.3 ppm
Animal tracks (appears to be racoon) observed in gypsum leading to and away from pooled water area.
Chlorine now up to 0.1 ppm and HCl up to 1.1 ppm.
Donned Level C ppe with full-face respirat.
ERM tried peristaltic pump method but it clogged. ERM wants to use dipper method. Prepared and signed Field Mod. Form.
Used a pole-mounted dipper to collect sample. VOC ~~sample~~ MS sample bottles filled directly first, then the dipper was used to pour water into splitter. VOC samples effervescing. ERM did not label bottles. A lot of sand/sediment in scoops from dipper.
Peristaltic pump not working for field filtering so a 5-gal bucket (new, and rinsed with sample volume) was filled

to take back to the field trailer. ERM attempted to use in line filter with the smaller peristaltic pump but the filters would immediately clog.
Unable to field filter samples. ERM decided to use unpreserved bottle for diss. metals and I did the same.
Sample loc. was not previously staked so ERM got GPS coords.
Tested and preserved CN bottles.
Went to office trailer to package samples.
Shipped samples to ALS-NY and SuRI, and ESAT. Will deliver remaining samples tomorrow
ERM soil sampling team collected PRI14 -012, -013, -014, and -015.

Collected sample
PRI4-13-SW01-112513-ES01
see field data sheet

11/26/13 US Mag Phase 1A RI Oversight

Went to office trailer to begin prep. PCB and PCDD/PCDF samples for shipment because we recieved CLP lab assignment of SwRI for these analyses.

Arrived on site at 8:20am

Met ERM water sampling team, Isaiah, Chris, and Trent, at office trailer.

ERM not collecting soil samples today.

Weather is partly cloudy, no wind, and temps in mid 30s.

Went to surface water sample loc. PRI14-006. There was a visible haze in PRI14 that appears to be chlorine. There were sustained Cl_2 readings at 0.1ppm and HCl at 0.2ppm Field team donned respirators.

ERM used a shovel to dig a hole in the surface water seep just south of the stake and submerged two steel bowls in the hole. The digging stirred up a lot of black sediment, the water was very turbid, and the black water filled the bowls. ERM pumped out the bowls to assess volume of surface water flow but the black water was not settling out.

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ERM doesn't think it is currently representative of surface water so the decision was made to leave the bowls in place and let the area settle out and return next week to sample.

Returned to the office trailer and ERM prepared for collecting surface water sample PRI4-008.

PRI4-008 not selected for EPA split.

Sustained HCl readings ranging from 0.6 to 1.2ppm at the office trailer.

ERM drove around to assess access to PRI4-008 and decided to enter from the SW corner of the gypsum pile. I attempted to follow the ERM team to the location but the gypsum mud, which started at about 1" deep, got to over 1' deep after about 50' into the gypsum pile. My foot wanted to pull out of my rubber boots and I had to use my hands to pull my boots out of the mud with every step and got gypsum all over my hands as a result. Cut over to graded area and left area and went to gaurd

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shack to wash my hands.

ERM decided to walk along the south side of the gypsum pile along the Main Ditch and then cut over to the sample location where the surface water from the gypsum slurry was flowing into the PRI16 waste pond.

I returned to watch ERM setup from a distance at the top of the gypsum pile. Observed the start of sampling and left the site.

Headed back to office trailer to package samples.

Samples from 11/25 shipped to SWRI & KAP, including all of the PCB and PCDD/PCDF samples; will deliver ALS-SLC samples Wed. morning.

US Mag Phase 1A RI Oversight 12/2/13

Went to office trailer to load up supplies.

Arrived on site at 8:00am

ERM on site shortly after along with Direct Push Services, the drilling and well development crew.

Jason ~~Brian~~ is going with the well instal. crew, Darren is going with the well development crew, and Chris and Trent are collecting soil samples in PRI14.

Went with Jason ~~Brian~~ and well instal. crew to PRI5 for the instal. of MW-17 and MW-19A & B.

Had H&S tailgate meeting

Weather is cloudy and cool with strong Easterly winds, so drilling locations are directly downwind of plant stack.

Air monitoring during tailgate meeting indicated Cl_2 steady at 0.1ppm and HCl btw 0.1 and 0.5ppm.

Donned PPE (Tyvek coveralls, rubber boots, glasses, hard hat, safety vest)

Set up at MW-17 location

Removed stake and hand augered to 5'

Clay encountered at ~3'

12/2/13

ERM not logging lithology during hand augering, but examined & logged after

Photographed all well materials - all well materials according to SOP with the exception of the sand - the SOP calls for a 20/40 mesh size and the sand they brought out is 10/20.

Notified Jason of descrepancy.

Drillers using 1" dia. acetate sleeves in 5' sections to continuously core the borehole.

Sandy silt w/ clay 0-2, clay from 2'-8', wet sand 8-10', no recovery 10-13', silty sand 12-14', fine sand w/silt 14-18' fine sand is saturated.

ERM not able to get 20/40 sand today so not setting wells.

Robert Howe onsite around noon.

Set up on MW-19A&B

Drove 2" rod with 1" core barrell to 25' and got refusal due to flowing sands.

Lithology similar to MW-17

Not advancing anymore boreholes today so left with Robert to observe soil sampling in PRI-14.

Stopped by PRI14-005 surface water sample

12/2/13

location - water had filled into steel bowls that were set, the sediment had settled and there appeared to be enough water and flow to sample.

Met up with soil sampling team and followed them to PRI14-001 soil sample location. Observed sample collection and processing.

Robert Howe left site at 2:20pm

Returned to ERM office trailer to observe soil sampling equip. decon.

Drilling equip. (drill rods) were pressure washed with cold tap water before drilling began, btw boring, and after. Note that decon SOP calls for all down-hole metal drilling equip. to be <u>steam cleaned</u> with high-pressure <u>hot</u> tap water.

All soil sampling equip. decon done according to SOP.

Soil sampling team collected PRI14-008, 010, 011, 009, and -001

Went to office trailer but locked out of daisy chain on entry gate. Talked to Jared w/ BLM and he said it would be open tomorrow.

12/3/13 US Mag Phase IA RI Oversight

Arrived on site at 8:15am

Weather is snowing with temps in mid 20s and light winds. 2-3" off new snow.

Jason of ERM in trailer with drilling crew. Had H$S discussion and talked about resolution of installing deeper wells in flowing sands. ERM wants to use prepacked wells. Today ERM has the 20/40 sand and are planning to install 2 wells.

Robert went with drilling crew to instal well MW-18. Lithology was diff. then what was expected so Robert returned to office trailer to discuss change in MW-18 lithology and screen interval. Robert discussed change with Andrew Schmidt and Andrew approved mod. to put screen interval below clay from 12-22'. Jason of ERM completed a field mod. form and I signed it.

Went to saturated surface solids sample location PRI14-006.

Collected PRI14-06-SS01-120313-ES01 - see field data sheet. Collected MS/MSD

12/3/13

volume for VOCs. Sample was very saturated with standing water on tray following collection.

Robert came to PRI14 sample location to discuss drilling issues and field mod. for well construction.

ERM collected additional volume (2 16oz jars) for lab sieve and % fines analysis

ERM also collected solids samples PRI14-007, and 002.

Went back to office trailer to package samples.

Samples shipped to SwRI, KAP, and ESAT

Will drop off samples to ALS tomorrow.

12/4/13 US Mag Phase IA RI Oversight

Arrived onsite at 8:00am

Jason of ERM prepared a field mod. form to not use quickset concrete for the well casing seal at MW-18 and I signed it.

Robert Howe heading out with drilling team to MW-13-MW-15 area

Headed out to PRI14 with ERM soil sampling team, Chris and Trent.

Collected saturated surface sediment sample PRI14-03-SS01-120413-ES01 see field data sheet.

Not enough sample volume to fill all EPA split sample jars. ERM collecting 2 additional 16oz. jars for fine fraction analyses. 3 4oz. and 1 8oz. remaining. Suggested field mod. for addition auger of volume and Chris called Kevin Lundmark and said they did not want to collect addition volume or re-sample.

Per discussions with Robert, Catherine, Ken, and Kevin Lundmark, the decision was made to disgard PRI-14-003 split sample and collect split of PRI14-005.

Collected surface soil sample

12/4/13

PRI14-05-SS01-120413-ES01 - see field data sheet.

Observed collection and processing of PRI14-004, but did not accompany ERM to sample site due to soft saturated sediment - ERM used snow shoes. ERM filled pan and brought back to truck to collect EnCore samplers and to sieve onto tray for homogenizing. SOP calls for collecting immediately after extraction of first auger aliquot.

Went to office trailer to process samples.

Samples shipped to SwRI, KAP, and ESAT.

Samples dropped off to ALS.

Weather was clear with temps in the teens.

12/5/13 US Mag Phase 1A RI Oversight

Arrived on site at 8:00am.

Met with Robert Howe and Jason of ERM to discuss lithology and well const. changes for MW-14. Signed field mod. form for not installing shallow well (MW-14A) and only installing one well to 15' with screen interval from 5-15'.

Robert headed out to oversee drilling team and installation of MW-14 and MW-15.

Went with soil sampling team, Lonnie and Trent, to PRI13.

Weather is mostly cloudy with snow flurries and temps in the single digits.

ERM collected soil samples PRI13-014 then PRI13-013 with hand auger. Both are clayey silt

Went to PRI13-012 location (EPA split loc.) and were unable to locate stake. Will return tomorrow with Trimble GPS unit to locate.

ERM collected soil sample PRI13-011 with hand auger. Soil was a silty sand.

ERM collected soil sample PRI13-010 with hand auger. Soil was clay and was difficult to press through 1/4" sieve.

At all 3 soil sample locations 99-100% of sample material passed through the 1/4" sieve.

12/5/13

Went to soil sample loc. PRI13-009 and stake had been pulled out so decision was made to come back tomorrow with the Trimble GPS and re-stake the location before sampling.

Layering in the auger holes was difficult to evaluate because the auger smears the hole and there was some cave in, but all locations appeared to be homogenous.

Met up with Robert at MW-15, ERM just finishing setting the well.

Soil sampling team returned to office trailer to decon sampling equip. All decon performed at office trailer, not in the field.

12/6/13 US Mag Phase 1A RI Oversight

Arrived onsite at 7:50am

Met with Robert Howe and Jason of ERM. Drilling team is planning on installing well MW-20 and Robert will provide oversight.

Went with soil sampling team, Lonnie and Trent, to PRI13.

Weather is clear with temps in the single digits and light northerly winds.

Went to soil sample location PRI13-012 Used Trimble GPS unit to locate sample location and re-stake it.

Collected soil sample PRI13-12-SS01-120613-ES01. See field data sheet.

ERM using 3 digit sample number (i.e. 012) rather than "xx" as stated in SAP.

ERM collected soil samples PRI13-009 and 008. Both in silty sand.

All soil sample locations on the east side of PRI13 are in area heavily traveled by shrimper ATVs (PRI13-010, and 012 are less traveled than others) so surface soils are disturbed.

Went around to N side of PRI13

12/6/13

Collected soil sample PRI13-03-SS01-120613-ES01 - see field data sheet.

Soil was clay and volume was being lost sticking to gloves and sieves so ERM decided to collect one additional hand auger aliquot to ensure there would be enough sample volume.

Clay was difficult to sieve and homogenize.

Had ample sample volume with 6 hand auger aliquots but 5 likely would not have been enough. Agreed with ERM to complete field mod. form when we got back to the ~~trailer~~ AE trucks.

Completed Field Mod. Form using language provided by Catherine for additional holes to provide sample volume for EPA split samples and I signed it.

ERM heading out to soil sample location PRI13-001 and that will be the last soil sample for today. Observed sample collection from a distance and left PRI13 to oversee drilling - Robert departed site around 1pm.

Observed drilling of MW-20A and departed site. Went to office trailer to package samples - no samples shipped today.

12/9/13 US Mag Phase 1A RI Oversight

Arrived on site at 8:00am

Went with Jason (ERM) and drilling crew (Direct-Push Services) to MW-19 location. ERM not soil sampling today.

Weather is clear and cold with light NW winds, temp. currently -10°F

Set up on MW-19B, drove core barrell to 25' and got refusal due to flowing sands.

While drillers removing core barrell Jason and I drafted a field mod. form for the installation of a pre-pack well and the SOP variance associated with the changes in well construction, and I signed it.

Drilled to ~33' with 8" auger, added ~20' of water to control flowing sands. Set 2 5' sections of prepack well casing and added 2 10' and 1 5' blank Sch. 40 PVC well casing above the screen.

Removed 10' of auger and ~~the casing came up out~~. Added 20/40 sand (2 1/2 bags) to 20'. ~~Added~~ Surged well then added bentonite chips (Puregold Medium chips) and let set for 30 min. Then added

12/9/13

Portland cement (1/2 47lb. bag mixed with ~5 gal of water) (Quikrete Portland Cement)

While removing augers clay began showing up in auger flights at ~28 to 29' and continued through end of auger (~33')

Started on MW-19A about 4' N of 19B. Drilled to 17 1/2' and added 20 gal. of water to control flowing sands. Started adding 20/40 sand at 17' and went to 6' (5 bags). Surged well, no drop in filter pack. Added bentonite chips (2 1/2 bags) from 6-2'.

Set up on MW-17. Geoprobe hole could not be located under the snow initially but later uncovered and measured at 13' NW of where drilling currently.

Drilled to 17 1/2", added 20 gal. of water, and popped plug, about 6" of flowing sand came into auger. Well screen set from 17-7'. Added 20/40 sand to 6'. Surged well with PVC surge-block, sand pack dropped ~2'. 4 3/4 bags of sand used initially, 1 3/4 bags added after surging to bring filter pack back up to 6'. Started adding bentonite chips and I went to observe setting well box at MW-19B before leaving site.

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All well installation procedures conducted according to SOP, except as noted in the field mod. form signed today.

Chlorine readings up to 0.1 ppm observed today.

Went back to office trailer to package samples.

Samples shipped to SwRI, KAP, ESAT, and ALS.

US Mag Phase IA RI Oversight 12/10/13

Arrived on site at 7:50am

Met with ERM soil sampling team, Jason, Trent, and Garrett, at their office trailer. Had H&S meeting.

Went to collect soil samples in PRI12.

Weather is clear, with light northerly winds and temp is currently -10°F.

ERM collected soil sample PRI12-001.

About 4" of snow at sample locations.

Collected soil sample PRI12-02-SS01-121013-ES01 - see field data sheet.

ERM collected PRI12-005, -003, -004, and -006. PRI12-003, -004, and -005 all in native soil, but -006 was different and appeared to be imported grayish sand. -006 is located on Hill Bros property between waste ponds.

ERM collected PRI12-007, -008, and -009. soil samples. -007 and -008 in native sandy silt but -009 appeared to be imported road base, a clayey sand with gravel. -009 is located on graded road.

Collected sample PRI12-10-SS01-121013-ES01.- see field data sheet

ERM forgot to fill fine fraction analysis

sample jars at PRI12-009 so the location was re-sampled and the original sample jars were discarded.

Soil sampling team used all clean sampling equipment so no more soil sampling today. Team heading back to office trailer to decon sampling equip.

Went to MW-14 to oversee well devel.

MW-15B developed earlier in the day.

Darron of ERM overseeing well development by Direct Push Services.

ERM is using the submersible pump, which has an OD of about 1.5" according to ERM, is being used to surge the well prior to pumping.

Darron said there has been an initial drop in water level after start of pumping but that recharge has been good in all new wells.

ERM is not using a flow-through cell to measure water quality parameters, they are collecting and analyzing grab samples at an approx. frequency of every borehole volume.

All other development procedures

appear to be being implemented according to the SOP.

No chlorine readings at PRI12 or PRI6.

Went to office trailer to package samples.

Samples shipped to SwRI and KAP, and delivered to ALS. Will ship pH samples to ESAT tomorrow.

12/11/13 US Mag Phase IA RI Oversight

Arrived on site at 7:45am

Weather is clear with light NW winds and temp. is currently -6°F.

ERM has 3 field teams working today - Darron is with well development team, Jason and Chris setting staffing gauges, and Trent and Garrett soil sampling.

Went with soil sampling team to PRI14 for soil sample re-collection.

Arrived at saturated sediment sample location PRI14-005 and there was a visible haze in the air and a strong chlorine odor, chlorine readings up to 0.2 ppm, team donned respirators.

Collected saturated sediment sample PRI14-05-SS01-121113-ES01 - see field data sheet. This is a recollection at PRI14-005 at a location ~8' WNW of original sample location to be co-located with the surface water sample. ERM is keeping same sample ID (PRI14-005-SS01) and changing the date in the sample ID.

Went to saturated sediment sample loc.

12/11/13

PRI14-006 to recollect VOC sample aliquots. No chlorine readings at this location.

ERM collected one hand auger bucket to fill EnCore samplers for VOC analysis.

Collected saturated sediment sample PRI14-06-SS01-121113-ES01 - see field data sheet. Collected MS/MSD volume. This is a recollect for VOC analysis only.

Observed ERM collect VOC sample at PRI14-007.

ERM soil sampling team heading to PRI14-008 for VOCs recollect and I headed to PRI5 to observe installation of staffing gauges.

Observed the installation of the staffing gauge at the SE corner of the PRI5 waste lagoon. (SGS) ERM using dock to access location. ERM is using 10' sections of sch. 80 pvc and driving it into the sediment by hand at the end of the dock. Then attaching a one meter staffing gauges to the PVC pipe in place with bottom of gauge on sediment surface.

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Water level on SG-5 is currently 0.90 ft.
ERM used Trimble GPS unit to mark location following installation.
Staff gauge installation procedures conducted in accordance with SAP Mod. 14C-2-10; however, unable to confirm that instal. procedures followed the U.S. Army Corps. of Eng. staff gauge set-up guide.
SG-5 was installed approx. 10' from shore (dock is 10' long).
Observed installation of staff gauge SG-4 and set up at SG-3 location.
Went to PRI12 to meet up with soil sampling team.
ERM prepared field mod. form for the two additional hand auger holes at PRI14-005 and I signed it.
Observed collection of soil sample PRI12-011. Sample location is in an area of salt and sand piles that have a rust color.
ERM done soil sampling for the day.
Went to office trailer to package samples. Samples shipped to KAP, SwRI, and ESAT, and hand delivered to ALS.

US Mag Phase 1A RI Oversight 12/12/13

Arrived on site at 8:00am
Met with ERM soil sampling team, Trent and Garrett.
Weather is clear with patchy fog, no wind and temp. is -6°F.
ERM collected soil sample PRI12-012. Location is in native silty soil in vegetated area.
Chlorine detected at 0.1 ppm.
ERM collected soil sample PRI12-013. Location is in same area as PRI-012 and had same soil type.
ERM collected soil sample PRI12-014 Location is in an area that appears to have been graded and disturbed in the past, but soil type (silt) was similar to PRI-12 and -13
Went to PRI-10, the Barium Sulfate Area.
ERM collected soil sample PRI10-001 Location is in area with little vegetation that appears to have been graded in the past. Soil was a silty sand with clay.
PRI10-004 location stake was missing so location was found with Trimble GPS unit but was not re-staked because ERM didn't have any stakes.

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PRI10-004 is in disturbed area between recently graded road and recent excavation. Soil is much more clayey than -001.

Wastewater from PRI-6 has migrated into excavation west of PRI10-004.

Collected soil sample PRI10-03-SS01-121213-ES01 and field duplicate -ES02.

2 additional auger holes were needed to get additional volume for field duplicate. ERM prepared a field mod. form and I signed it.

US Mag is taking soil from the north corner of PRI-6 to the east side of the dirt road that transects PRI-8 where the wastewater is flowing across the road. They appear to be building a berm to controll the water.

ERM collected soil sample PRI10-001 Soil was clay and was difficult to push through sieve and homogenize.

Collected soil sample PRI10-13-SS01-121213-ES01.- See field data sheet.

ERM finished soil sampling for the day.

Went to office trailer to package samples.

Samples shipped to SwRI, KAP, and ESAT; will deliver to ALS tomorrow morning.

US Mag Phase IA RI Oversight 12/13/13

Dropped samples off at ALS.

Arrived on site at 8:15am

Met with ERM soil sampling team, Chris and Trent.

Weather is foggy with no wind and temp. currently 10°F.

ERM soil sampling in PRI-10, the Barium Sulfate Area.

Alongside the recently improved dirt road that runs N-S through PRI-10 there is ponded water in the excavator bucket cuts approx. 1'bgs and the water appears to be wastewater from PRI-6.

ERM collected soil samples PRI10-005, -006, -007, and -009. All locations in same area with same soil type - sandy clay, slightly more sand at -005 location. All sampling proceedures conducted in accordance with the SOP. 5 hand auger aliquots collected at all locations. Approx. 2-3" of snow at all locations. ~99% of all sample volume passed through sieve (<1% roots and small rocks) at all locations.

Went to ERM office trailer to observe decon

12/13/13

procedures and equip. rinsate sample collection.

ERM is getting bulk DI water from Culligan in SLC, and are refilling 5 gal. containers.

Equipment blanks are being collected at a frequency of 1 per week, per SAP Mod. 14C-2-12.

All non-dedicated soil sample collection equip. placed on tray and DI water is poured over all the equipment at the same time and a funnel is used to capture water dripping from corner of tray to fill sample bottles.

The sampling equip. (auger bucket, steel trowel, sieve, and steel tray) was decontaminated the previous day and allowed to dry over night before collecting the equip. blank.

ERM field team could not verify if the rinse water was organic free water, deionized, or distilled water. The same water was used to collect all sample fractions.

Note that in Footnote (a) of WS#12 it states that analytically certified, organic-free water (or equiv.) will be used for organic

12/13/13

parameters, and deionized or distilled water will be used for inorganic parameters.

No more soil sampling today, ERM finishing decon and then packaging samples.

Departed site.

12/16/13 US Mag Phase 1A RI Oversight

Arrived on site at 8:00am.

Met with ERM field team and had H&S meeting with driller (direct push services).

ERM operating with 3 field teams today - Lonnie and Trent will be subsurface soil sampling, Chris will be developing wells MW-17 and MW-19A/B and Kevin and Garrett will be surveying locations and, if time permits, soil sampling in PRI-10.

Weather is foggy with no wind and temp. is 10°F.

Went with drilling team to subsurface soil sampling location PRI14-005.

Geoprobe rig used to collect 3 6-ft cores for sample volume. Poor recovery in all cores, particularly on the 2-3½ interval where only ~6" recovery was achieved in the first core. For each of the 3 borings, drove first core to 4', pulled out core, then cored 4-6' in same hole. Up to 6" sluff on 4-6' push but holes staying open.

Collected split sample from deepest

12/16/13

interval, 4-6', but not enough sample volume to fill all jars, had to fill perchlorate jar from middle interval, 2-4' - see field data sheet.

Tape measure not used by ERM to measure lithologic intervals, just estimated visually.

Did not backfill boreholes with bentonite chips, holes are submerged in black silty water.

No PID readings measured during screening of the first core, but volume was not placed in bag for further PID screening as stated in Sec. 6.3.1 of SOP USM-09.

All other proceedures conducted in accordance with SOP.

Reviewed boring log and agreed with ERMs soil classification.

No chlorine readings in PRI-14.

Went with drilling team to subsurface soil sampling location PRI8-017.

Geoprobe rig used to advance 3 boreholes.

Location is in burned road that separates PRI-8 from PRI-6. Drove first core to 13'

Native soil and saturation encountered at

12/16/13

~6', so ERM set the 3 2-ft sample intervals from 6-8', 8-10', and 10-12'.

Went to ~12.5' on second and third cores. ~4' recovery in first core, 3½' on second, and 2' on 3rd core.

Saturation increased with depth of sample interval. 10-12' interval had standing water after homogenization and was off-gasing (bubbling).

Not enough sample volume to collect all jars from one interval, had to spread out between all intervals and only had enough volume to fill half of last 8oz sample jar which was for TOC.

Collected split sample with 3 diff. sample IDs - see field data sheet for PRI8-17.

Bentonite chips used to backfill boreholes.

No PID readings measured during screening of first core, but volume was not placed in bag for further screening as stated in SOP.

Sample distribution for PRI8-17 was as follows:

PRI8-17-SB01-6-121613-ES01 - VOCs, SVOCs, PAHs, perchlorate

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PRI8-17-SB02-8-121613-ES01 - pH

PRI8-17-SB03-10-121613-ES01 - Metals, TOC, PCBs, PCDD/PCDF

Chlorine readings up to 0.1 ppm observed in PRI8.

Went to take a look at subsurface soil sampling location PRI10-008 and access for track-mounted drill rig. The driller did not think he could access the boring location due to snow, soft surface sediment, and shallow water table (<1').

Talked to Wiley, excavator operator for US Mag, and he did not recommend trying and did not think his excavator would be able to get in there to pull the drill rig out if he got stuck.

Went to discuss with Kevin. Decision was made not to try today. Kevin is going to reevaluate and get back to team with direction ERM wants to take.

Kevin and Garrett homogenizing sample PRI-10-12 & PRI10-14 at truck.

ERM teams done for the day.

Went to office trailer to package samples. Samples shipped to KAP, SwRI, ESAT; will deliver to ALS tomorrow.

12/17/16 US Mag Phase 1A RI Oversight

Dropped samples off at ALS.

Arrived on site at 8:30am. Met with ERM soil sampling team, Chris and Garrett, they are going to collect the last 2 remaining soil samples in PRI-10.

Trent and Lonnie of ERM arrived later, they went to pick up pre-packed well for MW-16 groundwater well installation and it was not the right one - will have to re-order custom screen.

Trent and Lonnie going to soil sample in PRI-8.

Went to soil sample location PRI8-001.

Weather is foggy with no wind and temp. at 12° F.

Collected split soil sample PRI8-01-SS01-121713-ES01 - see field data sheet. Good recovery from augers, 99.5% passed through sieve, ample volume.

No chlorine or HCl readings.

ERM collected PRI8-002 soil sample -002 in same area as -001 and had same soil type. Cattle observed grazing by -002 location.

ERM collected PRI8-003 soil sample.

12/17/16

PRI8-003 soil was much more moist than -001 or -002 and had a little more clay. Iron modeling observed near surface of auger holes. Location is about 100' N of what appears to be wastewater.

ERM done soil sampling for day, heading back to trailer to decon soil sampling equipment.

Headed to office trailer to package sample.

Sample shipped to KAP, SwRI, and ESAT and delivered to ALS.

12/18/13 US Mag Phase IA RI Oversight

Arrived on site at 8:00am

Met with ERM soil sampling team, Chris and Trent.

Weather is foggy with no wind and temp. at 9°F

ERM going to be surface soil sampling in PRI-8

ERM collected soil sample PRI8-004 in native clayey silt.

Tested pH in surface water along road and at west edge of angel wing and both were <1 using pH test strips, and water was lime green. A significant amount of wastewater is present in the angel wing as compared to when surface water sample was collected at PRI-005 and water color has changed from clear to lime green and gone from a pH of 5 to <1.

pH of water along road on N side of PRI-10 had pH of 5.

ERM collected soil samples PRI8-008 and -009. PRI8-008 same area and dry clayey silt soil type. PRI8-009

12/18/13

was much more moist and had iron rust colored modeling on the surface of the soil.

Approx. 2-3" of snow on the surface at PRI8-004 and -008, and ~1" at -009.

ERM collected soil samples PRI8-13 and PRI8-007. Most organic matter seen in any of the samples in PRI8 was observed in -007, about 5% of sample volume did not pass through sieve.

Looked at PRI8-006, area is now flooded with wastewater and is not accessible. Tested water with pH test strip and it had a pH of 1.

ERM done soil sampling, heading to trailer to decon equip.

Departed site.

12/19/13 US Mag Phase 1A RI Oversight

Arrived onsite at 8:45am, ERM arrived at same time.

Weather is snowing with 15mph N winds and temp at 27°F.

ERM planning to continue soil sampling in PRI-8.

Collected split soil sample PRI8-16-SS01-121913-ES01 - see field data sheet. ERM collected additional sample volume for fines analysis. Ample volume with 5 augers scoops.

Walked out to assess access to PRI8-010, -014, and -015. These locations are currently surrounded by wastewater on all sides and can only be accessed through N side of PRI-10, walking around to the N and then dropping in S to -014 and -015. There is ~6" of snow on surface and would likely not be accessible if not for the snow. Kicked depressions in soil at -014 and -015 and pH was tested in the water at 1. PRI-8-010 is surrounded by wastewater tested

12/19/13

to have a pH of 1. PRI8-010, -017, -005, and -006 all in wastewater with pH of 1 or less. ERM is not planning on sampling these locations any time soon.

ERM done sampling for the day.

Departed site.

12/20/13 US Mag Phase 1A RI Oversight

Arrived on site at 8:00am.

Weather is clear, no wind, temp. 10°F.

Met with ERM soil sampling team, Chris and Trent.

ERM not sampling PRI8-014 or -015 today because it has to go through addition H&S review.

ERM going to be collecting solids samples in PRI-9, the Smut Area.

Collected split solid waste sample PRI9-14-SS01-122013-ES01 - see field data sheet.

Chlorine readings up to 0.2ppm.

ERM collected solid waste sample PRI9-013-SS01-122013. from the smut piles.

ERM collected soil sample PRI9-012-SS01-122013 from native soil area south of the smut piles.

ERM collected field duplicates at all 3 sample locations (PRI9-012, -013, & -014) and as a result, 9 auger holes were collected at -014 and 6 auger holes were collected at -013.

ERM prepared one field mod. form for the additional sample aliquots

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at PRI9-013 and -014 locations and I signed it.

ERM finished sampling for the day.

Went to office trailer to package samples.

Samples shipped to ALS, SwRI, and ESAT, and hand delivered to ALS.

1/6/14 US Mag Phase IA RI Oversight

Arrived on site at 8:00am

Weather is clear with light S wind and temp. is 2°F.

Met with ERM soil sampling team, Chris and Trent, at field trailer.

ERM will be collecting solids samples in PRI9, the smut piles.

Went to solids sample location PRI9-011, located in SW area of smut piles.

Collected split solid sample PRI09-11-SS01-010614-ES01 and field dup. -ES02 - see field data sheet.

13 hand auger holes used for sample volume at PRI9-11. ERM will wait until the end of the day to prepare field mod. form.

Went to solids sample location PRI9-002 located in NE area of smut piles.

Collected split solid sample PRI09-02-SS01-010614-ES01 - see field data sheet.

9 hand auger holes used for sample volume at PRI9-002.

ERM collected solids sample PRI9-001. 3 augers were in white to gray smut and 2 were in black smut. Black smut

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had much higher moisture content. ~2%. sample volume did not pass through 1/4" sieve which was firm salt nodules.

Smut piles extend N of PRI9 boundary plotted on figure 14-9 in SAP.

ERM collected solids sample PRI9-003. Sample was collected in all white to gray smut; no black smut in sample. 95% of sample volume passed through sieve. 1" to 1/2" salt nodules not passing through.

All smut sample locations have been in loose smut that hand augers easily but still stays in the auger when being extracted.

ERM collected field duplicate at PRI9-003.

No Cl2 or HCl readings today.

Returned to ERM office trailer and ERM prepared field mod. form for additional sample aliquots at locations PRI9-11 and -002, and I signed it.

Went to office trailer to package samples.

Samples shipped to KAP, SwRI, and ESAT

Will deliver samples to ALS tomorrow morning.

1/7/14 US Mag Phase IA RI Oversight

Dropped samples off at ALS

Arrived on site at 8:30am

Met ERM soil sampling team, Chris and Trent, at office trailer.

ERM plans to continue solids sampling in PRI9, the Smut Area.

Went to solid sample location PRI9-004

ERM collected sample PRI9-004 and a field duplicate. 99% of sample volume passed through sieve. Sample was light brown with white salt granuals.

Weather is mostly cloudy with light S wind and temp. is 20°F.

ERM collected solid sample PRI9-007. Sample location is W of smut piles in sparsely vegetated area adjacent to road that runs along the western perimiter of PRI-9. Soil is mostly native silty sand, dry, brown, with some gray and white spreckles of smut.

~2-4" of snow on surface at both sample locations.

Arrived near PRI9-009 location and Cl2 readings up to 1.0ppm observed and there is a visible haze in area.

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Field team donned respirators and proceeded to sample location.

ERM collected solids sample PRI9-009. Sample is mostly black smut, some white speckles.

ERM collected solids sample PRI9-006 Sample was very similar to PRI9-009.

No HCl or Cl2 readings in PRI9-006 area.

ERM collected solids sample PRI9-005 Sample was mostly black smut, similar to -006 & -009. 98% passed through sieve.

ERM collected solids sample PRI9-008. Sample was entirely black smut that was very moist. 97% passed through sieve.

ERM collected solids sample PRI9-010 Sample was entirely black smut. 98% passed through sieve. Some gravel on surface at sample location.

Solids sampling in PRI9 is now complete. ERM done sampling today.

Departed site.

1/8/14 US Mag Phase 1A Oversight

Arrived onsite at 8:30am

Weather is snowing with SE winds and temp. is 25°F.

Met with ERM soil sampling team, Chris and Trent, at field office.

ERM plans to conduct surface solids sampling in PRI2, the Landfill.

Sample locations in PRI2 have not been staked. PRI2-003 location not accurate in Trimble GPS unit so handheld GPS unit used to mark location and then Trimble used to log location.

Collected split solids sample PRI2-03-SS01-010814-ES01 - see field data sheet. 1 additional hand auger aliquot, 6 total, used to get enough sample volume for split sample. ERM to prepare field mod. form when we return to office trailer.

Collected split solids sample PRI2-10 SS01-010814-ES01 - see field data sheet. 6" hand augers appear to have broke through soil cap as trash and non-cap material was encountered.

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ERM collected solids sample PRI2-011. Sample had same soil type as -003 and -010, but was brown, not rust colored.

ERM collected solids sample PRI2-012 Sample was a rust colored silty sand with some gravel, similar to -003 and -010.

ERM finished sampling for the day.

Returned to ERM field office trailer and ERM prepared field mod. form for the 1 additional sample aliquot at PRI2-003, and I signed it.

Returned to field office trailer to package samples.

Samples shipped to KAP, SwRI, and ESAT, and delivered to ALS.

1/9/14 US Mag Phase 1A RI Oversight

Arrived on site at 8:30am

Weather is snowing with light N winds and temp is 20°F.

Met with ERM soil sampling team, Chris and Trent, at office trailer.

ERM plans to continue surface soil sampling in PRI-2, the Landfill.

ERM collected solids sample PRI2-001
Sample was clean imported fill material, a sandy gravel. Area appears to have been recently graded and there were stockpiles of same material as sample nearby.

ERM collected solids sample PRI2-004.
Sample was a rust brown silty sand with gravel. A plastic trash bag was pulled up in one of the augers.

ERM collected solids sample PRI2-008
Sample was same material as -004.

ERM collected solids sample PRI2-005
Sample was same material as -004 & -008. Some cardboard encountered.

ERM collected solids sample PRI2-013
Sample is a brown silty sand with gravel. Sample is located in the

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ground level area of the Landfill approx. 20' S of the raised portion.

ERM collected solids sample PRI2-007
Sample is same material as -013 and in same ground level area as -013, but is located on top of soil stockpiles.

ERM collected solids sample PRI2-002
Sample location is in heavily traveled area where US Mag is staging steel beams. There is about a 1/2" layer of brown silty sand and what appears to be black smut with white specks to 6".

ERM finished with surface solids sampling in PRI-2 with the exception of the locations where there are also subsurface samples.

95% - 98% of material passed through the 1/4" sieve.

2-5" of snow on surface at all sampling locations.

No HCl or Cl2 readings.

Departed site.

1/13/14 US Mag Phase 1A Oversight

Arrived on site at 9:00am

Met with ERM field team, Lonnie and Trent, at office trailer. ERM planning on installing well MW-16 and collecting surface soil sample PRI15-008.

Weather is sunny with mild easterly winds and temp. is 36°F.

Went to MW-16 location in NW area of gypsum pile. Due to the thickness of the saturated gypsum mud near the well location, I was unable to access the location and had to observe from dry ground ~40' south. ERM used snow shoes to access location.

ERM used hand auger with 6" dia. auger bucket to advance borehole for MW-16.

Hole advanced to 20" below grade. Soft sandy clay encountered at 18" and firm clay observed at total depth (20").

Hole stayed open and filled with ~8" of water quickly after augering.

Saturated gypsum observed above clay.

ERM used pre-pack well casing comprised of 2", 0.01 slot, Sch. 40 PVC inner casing and a 4", 0.01 slot, sch. 40 PVC outer casing with

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20/40 silica sand between the two.

A 2" dia. and 2" long PVC threaded end cap was placed at bottom of casing.

About 3' of blank 2" Sch. 40 PVC casing threaded to top of screened casing.

Casing was placed in the borehole and 20/40 silica sand was added to approx. 2" above well screen and bentonite chips were added to top 4" and slightly piled up around casing at the surface. Distilled water was added to hydrate bentonite chips.

Measuring tape used to measure all steps of construction.

A PVC slip cap was placed on top of riser.

The well is slightly off from vertical.

The 12" well screen is set from 6"-18" below grade.

Well is located ~5' from edge of PRI-6 wastewater.

No Cl2 or HCl readings observed.

Went back to ERM office trailer and ERM filled out field mod. form for MW-16 well construction mods. and I signed it.

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ERM also prepared field mod. form for change in surface soil sample PRI15-008 location from previously approved modified location on AII property to the original proposed loc. in the Phase 1A RI SAP. I signed field mod. form.

Went to PRI15-008 sample location.

ERM collected surface soil sample PRI15-008. Surface was mostly bare soil, some grass. Soil was a fine grained silty sand and 100% of sample volume passed through 1/4" sieve.

ERM finished sampling for the day.

Departed site.

US Mag Phase 1A Oversight 2/4/14

Went to Muskrat field trailer to get sampling supplies.

Arrived on site at 8:15am

Received phone call from Catherine stating that CLP labs were not ready to receive samples and that split sampling would have to be postponed.

Met with ERM sampling team at office trailer. ERM sampling GW today with 2 field teams.

Lonnie and Trent planning to sample MW-13A & B and MW-14, and Chris and Garrett planning on sampling PZ-01, PZ-10, and PZ-12.

Observed ERM calibrate the Horiba water quality meters.

Weather is cloudy with light easterly winds and temp is 23°F.

ERM sampling teams started at wells PZ-01 and MW-13A.

Went with ERM team to MW-13A.

Well cap removed and allowed well to equilibrate for ~5min. before gauging DTW. DTW measured at 7.55' btoc

2/4/14

Using peristaltic pump with ½" OD polyethylene tubing intake set at 9' bgs. Pumping rate at ~ 500 ml/min.
Pumping through Horiba flow cell and into 5 gal. bucket.
Noticed that in SAP WS#17, Sec. 17.3.2 states that SOPs should include procedures for "Monitoring of VOC emissions with vapor monitors before and during sampling" for monitoring well and piezometer sampling. This procedure is not listed in SOP USM-07 and was not performed in the field.
Used PWT PID to measure VOCs at TOC during sampling and reading was 0.0 ppm.
Water quality parameters stabilized after purging ~5 gal. DO stabilized at 0.0
ERM collected GW sample MW-13A-01-020414
VOC sample containers filled first, then all containers, then field filtered containers.
Chlorine tested and was 0.05 mg/L.
ERM moved to well MW-13B.
Initial DTW was measured at 7.47' btoc.
Peristaltic pump tubing intake set at 14' btoc. Pumping rate at ~500 ml/min.

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Water quality parameters stabilized after purging approx. 7 gal.
ERM collected GW sample MW-13B-01-020414. Filled first VOA vial at 500 ml/min which caused some volatilization of the sample so flow rate was reduced for remainder of sample containers.
Went to meet up with other ERM sampling team - they had just arrived at PZ-10, after completing sampling at PZ-01 and PZ-12.
DTW measured in PZ-10 at 5.63' btoc
Initial purge rate measured at 1600 ml/min then reduced and measured at 1400 ml/min.
Pump intake set at 10' btoc.
Water quality parameters stabilized after purging approx. 8 gal.
DO stabilized at 0.0 mg/L.
ERM collected GW sample PZ-10-01-020414
Flow rate kept at 1400 ml/min during sampling. The SOP (USM-07) calls for flow rates between 100 - 500 ml/min.
All other gw sampling proceedures observed today were in accordance with SOP USM-07.

2/4/14

US Mag excavator working all day on west side of road that separates PRI 6 and PRI 8.

No chlorine or HCl readings today.

ERM maxing out NaOH drops at 100 for CN preservation and only getting pH up to 8-9.

A sink hole (~2'x2') is now present in the middle of the isthmus road between PRI 6 and PRI 7.

ERM got field vehicle stuck on way to sample MW-14 and as a result did not sample MW-14.

ERM finished sampling today.

Departed site.

US Mag Phase 1A RI Oversight 2/5/14

Arrived on site at 8:15am.

Met with David Gibby and went over plan for the day with the OSC.

Met with ERM groundwater sampling field teams.

Met with EPA OSC, Ping, had meeting with David Gibby, then went to PRI 8.

1. 40°56m 09.779sN 112°44m 13.226sW
   PDOP 1.86 Elev. = 4100.50.8' HAE
   pH = 5.5

2. 40°56' 12.432" N 112°44' 15.456W
   PDOP 4.41 Elev. = 4,145.92 HAE
   pH = 1

3. 40°56' 13.650N 112°44' 17.887"W
   PDOP 4.65 Elev. = 4,149.83' HAE
   pH = 1

4. 40° 56' 14.176"N 112°44' 22.787"W
   PDOP 4.40 Elev. 4,135.92' HAE
   pH = 1

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5. 40°56'10.684"N 112°44'25.731"W
PDOP 4.39 Elev. = 4,147.98' HAE
pH = 1 Located 450' S of PR18-006

6. 40°56'11.567"N 112°44'27.070"W
PDOP 3.08 Elev. = 4,151.43' HAE
pH = 1

7. 40°56'14.190"N 112°44'32.092"W
PDOP 3.06 Elev. = 4,148.97' HAE
pH = 1

8. 40°56'15.846"N 112°44'35.441"W
PDOP = 2.58 Elev. = 4,150.29' HAE
pH = 1

9. 40°56'18.545"N 112°44'40.192"W
PDOP 2.86 Elev. = 4,147.44' HAE
N tip of Angel Wing
Unable to get pH due to H2S concerns

10. 40°56'16.803"N 112°44'40.521"W
PDOP 2.71 Elev. 4,135.07' HAE
E extent of Angel Wing
Unable to get pH due to H2S concerns

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11. 40°56'12.919"N 112°44'37.022"W
PDOP 3.62 Elev. = 4,151.67' HAE
pH = 1

12. 40°56'11.828"N 112°44'36.385"W
PDOP 2.81 Elev. = 4,143.46' HAE
pH = 1

13. 40°56'09.758"N 112°44'34.207"W
PDOP 2.39 Elev. = 4,139.99' HAE
pH = 8.5

14. 40°56'08.788"N 112°44'32.487"W
PDOP = 2.12 Elev. 4,144.16' HAE
pH = 1 separate pool

15. 40°56'08.718"N 112°44'31.740"W
PDOP 2.33 Elev. = 4,142.98' HAE
pH = 2 main water body just E of #14

2/5/14

Walked around the perimiter of the Angel Wing in PRI8 with David Gibby and the OSC.
The OSC took pH readings and photographs and I recorded GPS coords. at 15 locations.
The OSC departed around noon and I met up with one of the ERM GW sampling teams at PZ-08.
Pump intake set at 9' ~~btoc~~ bgs, DTW measured at 5.12' btoc.
Water quality parameters stabilized after purging 4 gal.
ERM collected GW sample PZ-08-01-020514. No chlorine detected.
This sample team, Chris and Garrett, now using 500 ml/min as max. pumping flow rate per SOP USM-07.
Met up with other ERM sampling team at MW-15. In the process of collecting GW sample MW-15B-01-020514.
ERM already collected MW-14, MW-15A, and PZ-26 groundwater samples.
Went to well MW-4A.
DTW is 7.64 and pump intake set

2/5/14

at 9' bgs. PET tubing being measured by arm lengths (stretching out tubing in arms as far as they extend = 5').
Weather is clear with light SW winds and temps in high 20s.
No chlorine or HCl readings.
Water quality parameters in MW-4A stabilized after purging
ERM collected GW sample MW-4A-01-020514
Other sampling team went to MW-17 and collected GW sample MW-17-01-020514.
The wastewater pond in PRI5 is now up to well MW-19A/B, about an inch of water around well vaults.
ERM finished with sampling for the day.
Departed site.

2/6/14 US Mag Phase IA RI Oversight

Arrived on site at 8:15am

Kevin Lundmark, David Abranovick, and one groundwater sampling team, Trent and Garrett, on site for ERM. Kevin and David are walking the Angel Wing and GW sampling team are sampling wells around the Landfill.

Went with GW sampling team to well MW-7.

DTW in MW-7 measured at 10.73' btoc. and pump tubing intake set at 13.5' btoc. Purge flow rate at 500 mL/min with no drawdown.

Reviewed field mod. for increased purge and sampling flow rates and sent Catherine e-mail with my approval.

Water quality parameters stabilized after purging ~4 gal. No chlorine.

ERM collected GW sample MW-07-01-020614. No additional NaOH required for CN preserv.

Went to well MW-6. ERM Cl_2 monitors alarming upon exiting their vehicle so I stayed in my vehicle. ERM donned respirators and continued air monitoring.

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ERM measuring Cl_2 up to 5ppm sustained so decision was made to leave area.

Returned to office trailer, waited ~30min. and returned to MW-6.

Again there were sustained Cl_2 readings between 3-5ppm so we left the area. Cl_2 gas coming from Cl_2 discharge pipe area at N end of chlorine ditch.

ERM sampling team went to talk to Kevin and his direction was to try and sample PZ-24.

Went to PZ-24 and there were sustained Cl_2 reading between 3-5 ppm there also.

ERM decided to call it a day and try the sample locations again tomorrow.

Departed site.

2/7/14 US Mag Phase IA RI Oversight

Arrived on site at 8:15am

Met with ERM groundwater sampling team, Chris and Trent.

Weather is mostly cloudy with ~10mph northerly winds and temp. at 28°F.

Went to well MW-6. No Cl_2 readings. DTW measured at 9.58btoc and pump intake set at 12' bgs. Flow rate at 500 mL/min. Water quality parameters stabilized after ~6 gal. and ERM collected GW sample MW-06-01-020714.

Chlorine gas readings up to 1.2ppm encountered during MW-6 sampling and team donned respirators.

Went to well MW-5A. DTW measured at 9.58' btoc, pump intake set at approx. 12' bgs. Flow rate at 500 mL/min. Water parameters stabilized after purging ~3 gal. ERM collected GW sample MW-05A-01-020714. Water from MW-5A was turbid initially then cleared up. Pump tubing lowered to bottom of well then retracted ~5' so that process may have stirred up sediment from bottom.

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Went to well PZ-24. DTW measured at 3.98' btoc. Pump intake set at ~8' bgs, ~5' from bottom of well. Pump flow rate set at 500mL/min. No drawdown. Water quality parameters stabilized after purging ~3 gal. Well is ~10' S of Main Ditch and pH was 6. ERM collected GW sample PZ-24-01-020714. Cl_2 readings as high as 1.8ppm, team in respirators entire time at PZ-24.

ERM done sampling for the day.

Departed site

2/11/14 US Mag Phase IA RI Oversight

Arrived on site at 8:15am.
Met with ERM field team, Kevin and Lonnie, at office trailer. ERM planning to collect surface water samples - PRI14-005 and 2 in PRI8.
Weather is partly cloudy with light northerly winds and temp at 33°F.
Went to surface water sample location PRI8-020. Used Trimble GPS unit to record location. Sample location is 87' west of surface soil sample location PRI8-011. GPS coords. are 4532994.50 N 353783.71 E PDOP 2.03
ERM collected surface water sample PRI8-020-SW01-021114. Sample had a lime/yellowish green color and a pH of 0.46. Chlorine was measured at 0.12 mg/L. CN bottles turned rust colored when water mixed with preservative (NaOH).
ERM estimated water depth at sample intake to be 4" deep and intake at 1" above bottom. Water depth was not physically measured as described in SOP USM08, Sec. 6.2, #2.
Pump flow rate was lowered to fill VOAs.

2/11/14

Surface water at PRI8-020 appeared to be stagnant.
No Cl_2 or HCl air readings at PRI8-020.
Walked W down road in PRI8, observed location stake for PRI8-010 surface soil location, and then continued to nearest surface water shoreline W of PRI8-010 as indicated in SAP Mod, to collect surface water sample PRI8-021. Location is 680' W of PRI8-010. Used Trimble GPS unit to record location. Sample loc. coords. are 4533009.50 N 353437.30 E, PDOP 1.48.
ERM collected surface water sample PRI8-021. pH was 0.29, Cl_2 was 0.11 mg/L. Water depth was ~2" with intake set at mid point. Same observations as PRI8-020.
Went to surface water sample location PRI14-005. Collected split sample PRI14-05-SW01-021114-ES01. See split sampling field data sheet. There is a seep to the NW of this sample location that may be contributing surface water at this location, but most of

2/11/14
surface water from PRI14-005 is being fed by large pool to the ~~east~~ west.
ERM finished sampling for the day.
Went to office trailer to package samples.
Samples shipped to ALS-NY, SwRI, and KAP. Will ship to ESAT and deliver samples to ALS-SLC tomorrow.

US Mag Phase 1A RI Oversight 2/12/14
Dropped samples off at ALS.
Arrived on site at 9:00am
Met with ERM field team, Chris and Lonnie. ERM planning to collect 2 remaining surface water samples in PRI8 (PRI8-018 & -019).
Went to surface water sample location PRI8-018. Collected split sample PRI8-18-SW01-021214-ES01. See field data sheet. Surface water depth at PRI8-018 was estimated as 12" but was not measured. Location is connected to main water body in PRI8.
Noticed that US Mag has used snow shoe refractories (bricks) and other debris to construct or reinforce the road between PRI6 and PRI8.
Went back to ERM office trailer to decon the splitter. Decon performed according to SOP.
Went to surface water sample location PRI8-019. Collected split sample PRI8-19-SW01-021214-ES01. See field data sheet. Surface water depth at PRI8-019 was estimated as 12" but was

2/12/14

not measured.

Noticed that in areas previously submerged with wastewater on the north side of the angel wing there was rust colored sediment layer underneath the top ~.5" of surface clay and a rust colored ring around the perimeter of the wastewater impact.

While walking back to field vehicle on N side of Angel Wing, I was directly down wind of the Plant stack and Cl_2 readings were sustained at 0.2 ppm. Donned respirator until I moved out of the area.

Trent (ERM) was working with surveyors to survey all the GW wells and staff gauges.

Went to office trailer to package samples.

Shipped samples to KAP, SwRI, ESAT, and ALS-NY. Will deliver samples to ALS-SLC tomorrow.

US Mag Phase IA RI Oversight 2/13/14

Dropped samples off at ALS.

Arrived on site at 9:00am

Met with ERM field team, Chris and Garrett. ERM planning to collect GW samples from 2-3 wells. Trent (ERM) is already out with surveyors surveying GW wells and staff gauges.

Went to GW well MW-18 located in Smut Area. Collected split GW sample MW-18-01-021314-ES01 and field duplicate MW-18-01-021314-ES02. See field data sheet.

Went back to ERM office trailer to decon the splitter, which is the only non-disposable water sampling equipment.

The decaport splitter works well but does not always distribute sample evenly between all bottles. ERM typically using 4-8 of the sample ports from the splitter at any given time.

Went to GW well PZ-04 located in Smut Area. Collected split GW sample PZ-04-01-021314-ES01. See field data sheet.

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ERM done sampling for the day.
Went to office trailer to package samples.
Samples shipped to KAP, SuRI, ESAT, and ALS-NY. Will deliver samples to ALS-SLC tomorrow morning.

US Mag Phase IA RI Oversight 2/14/14

Dropped samples off at ALS.
Arrived on site at 9:00am
Met with ERM field team, Lonnie and Trent. ERM planning to collect GW samples from wells MW-19A&B.
Went to well MW-19. Started with MW-19A. The wells are surrounded with wastewater on three sides and a few feet around the base of the well vaults. Wastewater is shallow - about 1" deep.
Collected split GW sample MW-19A-01-021414-ES01. See field data sheet.
During sample collection Cl_2 air readings up to 0.7ppm and HCl up to 0.4ppm measured and the team donned respirators. MW-19 was downwind of the Plant stack.
Returned to ERM office trailer to decon the decanport splitter.
Returned to well MW-19B to collect GW sample.
Similar air conditions to when we left because well is still downwind of Plant stack. Team donned respirators. Cl_2 air readings as high as 1.7ppm.

2/14/14
Collected split GW sample MW-19B-01-021414-ES01. See field data sheet.
Returned to office trailer to package samples.
Samples shipped to KAP, SwRI, ESAT, and ALS-NY. Will deliver to ALS-SLC on Monday.

US Mag Phase IA RI Oversight 2/17/14
Dropped off MW-19A/B samples at ALS and picked up bottle order.
Arrived on site at 9:00am
Met with ERM field team Chris and Garrett. ERM planning to sample GW wells in the Landfill.
Went to GW well LF-01.
Weather is partly cloudy with light variable winds, and temp. is 33°F.
Collected GW split sample LF-01-01-021714-ES01. See field data sheet.
Went back to ERM field trailer to decon decaport splitter.
Went to GW well LF-03.
Collected GW split sample LF-03-01-021714-ES01. See field data sheet.
No Cl_2 or HCl air readings in Landfill area.
Went to office trailer to package samples.
Shipped samples to KAP, SwRI, ESAT, and ALS-NY. Will drop samples off at ALS-SLC tomorrow.

2/18/14 US Mag Phase IA RI Oversight

Dropped off samples at ALS.
Arrived on site at 8:45am.
Met with ERM field team, Kevin and Lonnie. ERM planning to collect GW samples from well MW-08A & B.
ERM deconed decaport splitter and added 10 new PET tubing strips to collect equipment rinse blank. DI water poured into top of splitter and 10 bottles filled simultaneously. Aliquots for all analyses collected except for VOCs and diss. metals and CN. Perchlorate and Hex. Chrom. not field filtered.
Weather is clear with light variable winds and temps. in the 40's F.
Went to well MW-08.
Cl_2 air readings ranging between 0.1 and 1.2 ppm, and HCl ranging between 0.2 and 1.0 ppm. Field team donned respirators.
ERM started on well MW-08B.
Well TD is 40.78 bgs with screen interval

2/18/14

between 27-37' bgs. DTW is 9.70 and pump intake set at ~35' btoc.
Water being discharged directly to Main Ditch.
MW-08B had the highest DO (2.95 mg/L) at stabilization that I have observed in any of the GW wells. Most have stabilized at 0.00 mg/L.
ERM collected GW sample MW-08B-01-021814.
ERM collecting field duplicate and MS/MSD volume from MW-08B.
Field duplicate sample ID is MW-08B-11-021814.
Moved to well MW-08A. Well TD is 26' btoc with screen interval between 9-24' btoc. DTW is 9.82' btoc and pump intake set at ~17' btoc.
MW-08A has better recharge than -08B and was able to sustain purge rate of 2 L/min.
ERM collected GW sample MW-08A-01-021814 including MS/MSD volume, and field duplicate MW-08A-11-021814. Water from MW-08A has a yellow hue.
In respirators entire time at MW-08.
ERM done sampling. Departed site.

3/5/14 Landfill Geophysical Survey

Arrived on site at 8:30 am.
Met with Chris of ERM and discussed scope of the Landfill Geophysical Survey.
Met with ERM's sub., Geostratta, and had H&S tailgate meeting.
Went to Landfill and started with resistivity transect A-A' for sample location PRI02-006.
Geostratta used Trimble GPS unit to locate PRI02-006, however to the west there is a large depression in the surface soil that the transect would have to cross, so decision was made to move PRI02-006 N by 10'. Location of transect A-A' is between the two access roads on Landfill and runs E-W.
Geostrata ran 140' of measuring tape in both ~~locations~~ directions and drove electrodes every 5'.
Weather is clear with light N winds and temps. in mid 30s.
56 electrodes running 135' in east direction and 140' in west

3/5/14

direction from sample point for a total transect length of 275'.
Transect line is not perfectly straight.
W end of transect A-A' GPS coords:
4531290.00 N 354323.88 E PDOP 1.68
Elev. NA, topo change is ~4-6' along transect.
Center of transect GPS coords:
4531301.32 N 354364.07 E PDOP 1.65
E end of transect GPS coords:
4531313.48 N 354404.38 E PDOP 1.67
ERM drove stakes at each of the GPS locations.
Note that the Test Plan states "The actual electrode spacing will be determined in the field based on the results of running a test current" but a test was not conducted.
Test was run for ~1.5 hrs.
Preliminary data processing was conducted and results indicated native soil was distinguishable from landfill material, not many bad data points, some anomalies, RMS was 7.1. Max. depth of penetration was about 13 meters.

3/5/14

Moved to resistivity transect C-C' for sample location PRI02-014.

Worked with ERM to align transect with historical ditch. 6' steel stakes painted orange were placed at either end (N and S) of the Landfill aligned with the center of the ditch on each side. Transect C-C' was aligned with the stakes.

Used GPS to mark PRI02-014 and location is only about 10' from S face of Landfill.

Geostata ran measuring tape and placed 56 electrodes with 5' spacing for a total transect length of 275'. Transect line C-C' does not cross proposed location for PRI02-014.

Chlorine gas readings up to 0.8 ppm observed so team donned respirators.

Transect line is straight and ~2' topo. change accross line.

S end of transect C-C' GPS coords:
4531261.85 N 354613.21 E PDOP 1.72

Center of transect GPS coords:
4531285.72 N 354579.30 E PDOP 1.59

3/5/14

N end of transect GPS coords:
4531311.93 N 354545.98 E PDOP 1.58

Preliminary data processing was conducted and results indicated native soil interface was harder to differentiate towards S end, penetration around 14 meters, RMS was 5, some anomalies, few more than A-A', around 6 anomalies, also a few more bad data points.

Test was run for ~1.5 hrs.

Except where noted, all procedures were conducted according to the test plan.

3/6/14 Landfill Geophysical Survey

Arrived on site at 8:20am
Weather is cloudy with variable wind and temp. at 48°F.
Met with ERM (Lonnie) and Geostrata at field trailer and had H&S meeting.
Trent of ERM also on site with surveyor to resurvey staff gauges.
Went to Landfill to complete resistivity transects B-B' and D-D'.
Used Trimble GPS unit to plot sample location PRI02-009. Due to proximity of PRI02-009 to N face of Landfill, the center point for the intersection of B-B' and D-D' had to be shifted south so B and D' would not extend down face of Landfill. PRI02-009 original proposed location is still included in the B-B' transect. Center point of transect cross is in line with center of ditch (the former diversion ditch). Center shifted approx. 50' south from location shown on Figure 1 of Test Plan.
Geostrata started with transect D-D'. Measuring tape was run 130' in easterly

direction and 145' in westerly direction for a total transect length of 275'. 56 electrodes placed with 5' spacing along transect.
Transect line is straight and ~5' topo. change accross line.
E end of transect GPS coords:
4531398.47 N 354489.43 E PDOP 2.01
Center of transect GPS coords:
4531363.40 N 354469.53 E PDOP 2.01
W end of transect GPS coords:
4531325.15 N 354447.13 E PDOP 2.07
Chlorine gas readings up to 0.7ppm observed so team donned respirators.
Preliminary data processing was conducted for D-D' and results indicated high resistive area near center, native ~20; could not tell where ditch was, penetration is 51.4', RMS 21.5%, data quality was good.
Geostrata then set up transect B-B'
Measuring tape was run 135' in southerly direction and 140' in northerly direction for a total transect length of 275'
56 electrodes placed with 5' spacing along transect. Transect line is

3/6/14

straight and in line with former diversion ditch.

South end of transect GPS coords:
4531333.40 N 354515.79 E PDOP 1.75

Center of transect GPS coords:
4531358.77 N 354483.04 E PDOP 1.70

North end of transect GPS coords:
4531383.85 N 354448.81 E PDOP 1.68

~2' topo. change accross transect.

Preliminary data processing conducted for B-B' and results indicated two large anomalies just off from center, penetration was 45.7, RMS is 7.5%.

Geophysical survey has been completed. Except where noted, all proceedures were conducted according to the test plan.

US Mag. Phase IA RI Oversight 3/24/14

Arrived on site at 8:30am.

Met with ERM field team, Chris and Trent. ERM planning to survey soil sample locations in PRI 8 to determine if wastewater has receded enough to access locations PRI 8-005, -006, -010, -014, -015, and -017.

Weather is sunny with light N wind and temp is 38°F.

On way out to PRI 8 there was a dead raven in road through smut piles, and a golden eagle was perched on a soil pile in SW corner of PRI 10.

Wastewater levels have receded in PRI 8.

Looked at sample loc. PRI8-017 from road. Nearest surface water to -017 is ~15' south of stake and ground appears saturated but location is accessible.

Went to sample loc. PRI8-006. Loc. is muddy but accessible, surface water has receded to ~60' south of stake. Surface water tested with pH test strip and pH was 6.

3/24/14

Went to sample loc. PRI8-005. Stake is visible but location is under water. Surface water shoreline is 130' N of the stake. pH of water is 6.5. ERM determined that loc. is not accessible due to surface water depth (~1-3') and the presence of sink holes.

Went to SW sample loc. PRI8-019. Loc. is saturated with small pools of SW. ERM proposed to collect -005 at -019 location so soil sample would be co-located with -019 SW sample.

Four-strand barbed wire fence has been constructed around WW release on BLM land. Fence line provides good buffer btw impacted area & fence.

Looked at sample loc. PRI8-010, -014, and -015. All locations are very muddy but accessible, no surface water.

ERM tested pH of surface water on N side of road btw road and PRR8-017 loc. and pH was 0.

ERM measuring water levels for the remainder of the day. Departed site.

US Mag Phase IA RI Oversight 3/25/14

Arrived on site at 8:30am.

Met with ERM soil sampling team, Chris and Trent. ERM collecting surface soil samples in PRI8 today.

Weather is sunny with light NW wind and temp is 38°F.

Went to soil sample location PRI8-006, which is in an area that was recently covered with wastewater. Surface soil is still very moist and muddy, but most of moisture is held in top inch of clay, in auger holes the soil from ~2"-6" was much more dry. Iron staining beneath top inch of clay. Soil is a silty clay. 100% sample volume passed through 1/4" sieve.

ERM collected soil sample PRI8-006-032514-SS01.

Went to soil sample location PRI8-015. Collected split sample PRI8-15-SS01-032514-ES01. See field data sheet.

ERM collected soil sample PRI8-017-SS01-032514. Water came up in auger holes to near surface. pH

3/25/14

of water in auger hole tested with pH test strip and pH was 6.5. The nearest surface water is ~12' to the south of PRI8-017 and pH was tested with pH test strip and pH was 1. Soil is silty clay, saturated, and 100% of sample volume passed through sieve.

Drove down isthmus road and it appears that a significant wastewater breach has occurred between PRI6 and PRI7. Looked like quite a bit of work had been conducted and a black liner had been installed on E side of road.

No chlorine gas measured today.

Departed site and went to office trailer to package samples.

Samples shipped to KAP, SwRI, and ESAT, and had delivered to ALS.

US Mag Phase IA RI Oversight 3/26/14

Arrived on site at 8:30am.

Met with ERM field team, Chris and Trent. ERM planning to collect surface soil samples PRI8-010 and -014.

Weather is cloudy with scattered rain, light E wind, temp. is 44°F.

Went to soil sampling loc. PRI8014. DTW in first auger hole at ~4" bgs so ERM collected EnCores for VOCs. pH of water was 6. Soil is saturated silty clay. 100% of sample volume passed through sieve. ERM collected fines analysis volume from -014, and collected field duplicate.

ERM sample ID is PRI8-014-SS01-032614 for primary and PRI8-014-SS11-032614 for duplicate.

ERM collected soil sample PRI8-010-SS01-032614. No water observed in auger holes. Soil not saturated so no VOC samples collected.

ERM finished sampling for the day.

No Cl_2 or HCl detected today.

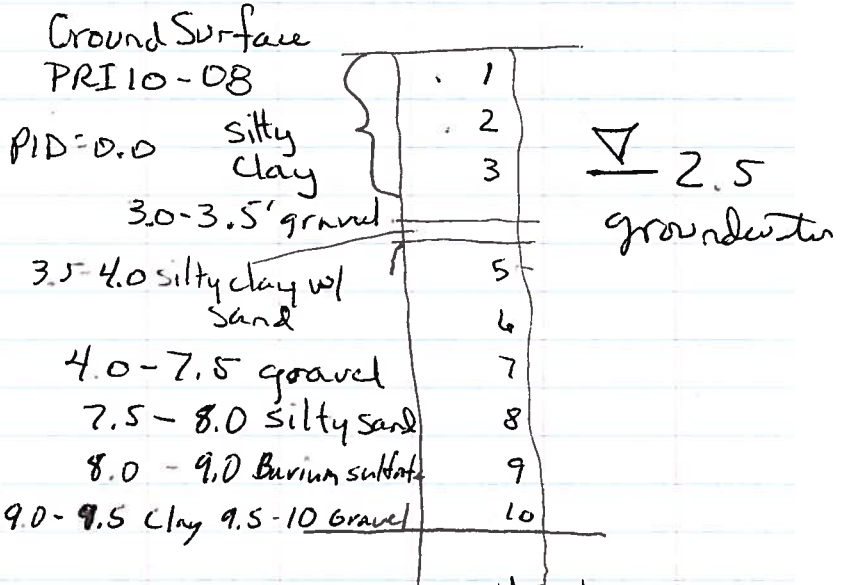
Departed site.

5/5/14 US Mag Phase IA RI Oversight

Picked C. LeCours up at 8:15
Went to field trailer to pick up sampling supplies.
Gave Catherine tour of US Mag site.
Catherine attended US Mag safety orientation with drillers.
Met with ERM field team, Lonnie and Chris, and drillers from Cascade drilling.
Mobed out to PRI 10 for drilling and collection of subsurface soils samples from PRI 10-008.
Cascade Drilling using a track-mounted Sonic drill rig, equiped with a 6" drill casing and a 4" core barrell. Drove 10' of casing, pulled out, and released 2-3' sections of soil core into plastic bags. Borehole backfilled with bentonite chips (Holeplug) and was not hydrated due to the presence of shallow GW (~2').
0-2.5 core compressed into ~6" upon extraction. 0ppm on PID. EnCore samplers filled upon opening plastic sleeve, EnCores pre-engaged and

5/5/14

manually filled rather than plugged.
0-2.5' core was dry, 2.5-5' core was saturated, so DTW is at ~2.5'.



10 feet total depth

0.5-2.0 PRI10-008-SB01-.5-050514
2.0-4.0 PRI10-008-SB02-2-050514
4.0-6.0 PRI10-008-SB03-4-050514
6.0-7.5 PRI10-008-SB04-6-050514
PWT SPLIT PRI10-08-SB04-6-050514-ES01
Sample collected 1400 for VOC
ERM processed/sieved intervals for 1/4" mesh.
~~Note: location did not have utility locate~~
CL

5/5/14

ERM's clearance SOP was waived for PRI10 and PRI2 for 5' hand auger requirement.

Note that SOP USM-09 calls for boreholes to be backfilled with 1/4" bentonite chips and 3/8" bentonite chips were used.

On 2-4' interval about 40% of sample volume would not pass through 1/4" sieve.

No PID readings in entire 10' core.

9-10' of core appears to be native material and 8-9' appears to be waste material (looks like smut) so the question was posed as to whether or not 1' of native is conclusive that we are completely into native soil considering the layering that was encountered throughout the core.

ERM collected sample PRI10-08-SB05-8-050514 from what appeared to waste material from 8-9' (entire 2' interval not homogenized and sampled because sample focused on just waste and not native on top and bottom of 8-9' interval.

1600 left USMag - no samples shipped -

END OF DAY — CA

~~5/5/14~~

~~AB + CL left USMag 1600 to Muskrat for sample processing~~ CA

Cancelled

5/5/14

5/6/14 US Mag Phase 1A RI Oversight

Picked Catherine up at 7am, arrived on site at 7:50. Met with ERM at field trailer then went to ATI.

Attended ATI contractor safety orientation

ERM has 2 field teams on site. Chris and Trent conducting surface soil sampling in PRI 11, ATI, and Kevin and Lonnie with drillers for subsurface soil sampling in PRI 2.

Catherine going with drilling crew and I am going with surface soil sampling crew to PRI 11.

ERM collected surface soil sample PRI11-014-SS01-050614. Location is in a low lying drainage area and soil was a dry silt. 99% passed through 1/4" sieve. No vegetation around sample location.

ERM collected surface soil sample PRI11-013-SS01-050614. Location is in sparsely vegetated area adjacent to perimeter road. Soil is a dry silt. 95% passing through 1/4" sieve.

Weather is sunny with strong N wind and temps in the 40°s F.

ERM collected surface soil sample

5/6/14

PRI11-012-SS01-050614 in greasewood shrub area to the south of ATI. Soil is a dry silt with a dried cracked clay layer on surface. 95% passing through 1/4" sieve.

ERM collected PRI11-011-SS01-050614 and PWT collected/accepted split surface soil sample PRI11-~~011~~-SS01-050614-ES01 see field data sheet.

Went to guard shack to enter US Mag and eyes started burning immediately upon exiting the vehicle and there was a faint odor but did not appear to be chlorine, meter did not alarm. This occurred at 12:26pm. ERM had same burning in eyes. My eyes burned for next 20 min, flushed with eye drops but eyes still sore. Faint headache also.

ERM collected surface soil sample PRI11-003-SS01-050614 and PWT collected EPA split sample PRI11-03-SS01-050614-ES01. See field data sheet.

Went to Landfill so ERM soil sampling team could help drilling team.

ERM processing soil samples from

5/6/14

boring PRI2-009. Catherine on site tour with Kevin Lundmark.

ERM mobilized drill rig to PRI2-006 boring but did not start drilling due to thunderstorm. Rain and lightning continued so ERM is calling it a day.

Departed site and went to office trailer to process samples.

Samples shipped to KAP, SwRI, and TechLaw; ALS samples on ice for hand delivery on 5/7.

US Mag Phase 1A RI Oversight 5/7/14

Picked Catherine up at 7am and arrived on site around 8am.

Met with ERM field teams - Trent will be surface soil sampling in PRI 11 and Lonnie and Chris will be with drillers in PRI 2.

Lonnie informed PWT that they decided to drill PRI2-006 boring to 20' after PWT departed site because the weather cleared. ERM did not attempt to contact PWT to inform us of the decision to drill PRI2-006. Lonnie offered to core another boring adjacent to the current boring so Catherine could observe the lithology and PWT and EPA agreed that would be acceptable.

My eyes are still sore from yesterday's exposure so Catherine and I called Dorthea to report it.

Catherine went with Drilling team to PRI 2 and I went with Trent to oversee surface soil sampling in PRI 11.

Before heading to PRI 11, Trent and I

5/7/14

went to talk to David Gibby about what might have caused my eyes to burn. Ended my talking to Rodger about it and he said it was likely "tear gas" that is created when they are laying down epoxy coating on the concrete floors in the Plant. He spoke to someone in operations and confirmed that they were in fact applying the epoxy coating at the time of my exposure (5/6/14 at 12:27pm). The fumes from the epoxy, when mixed with the Cl^2 and HCl in the air, create "tear gas." Rodger said that he and other US Mag employees have experienced the same thing in the past when they are applying the epoxy.

Went to ATI plant with Trent.

ERM collected surface soil sample PRI11-009-SS01-050714. Location is just south of railroad tracks in what appeared to be imported gravel road base material.

5/7/14

Weather is cloudy with rain, N wind, and temps in the 40°s F.

ERM collected surface soil sample PRI11-007-SS01-050714. Location is just north of railroad tracks in flat graded area on W side of ATI property. Material is similar to -009- gravel road base. Additional sample jars filled for fines analysis.

Near PRI11-008 there were 4 antelope laying down when we arrived.

ERM collected surface soil sample PRI11-008-SS01-050714. Location is SW of ATI on top of large soil stockpile. Soil is a silt with some gravel. Soil was saturated due to rain.

ERM collected surface soil sample PRI11-010-SS01-050714. Location is south of ATI on top of large soil stockpile. Soil is a silt with some sand. Additional jars filled for fines analysis.

ERM collected surface soil sample PRI11-001-SS01-050714. Location is

5/7/14

west of main ATI building in flat graded area consisting of gravel road base material.

ERM collected surface soil sample PRI11-004-SS01-050714. Location is N of main ATI building in flat graded area consisting of gravel road base material. Additional jars filled for fines analysis.

ERM returned to office trailer to decon. soil sampling equipment. Observed decon. proceedures.

ERM collected surface soil sample PRI11-006-SS01-050714. Location is just north of ATI parking lot and landscaped area. Soil is clay with some gravel and surface vegetation.

ERM collected surface soil sample PRI11-002-SS01-050714. Location is in disturbed soil between ATI and US Mag. Sparse vegetation. Soil is silt with surface gravel. Adjacent to drainage basin.

ERM collected surface soil sample

5/7/14

PRI11-005-SS01-050714. Location is in disturbed soil area just N of railroad tracks. Soil is sandy silt with some gravel. Sparse vegetation. Additional sample volume collected for fines analysis.

Surface soil sampling in PRI 11 now complete. All locations sampled where proposed with scoop method from 0-2" according to SAP/SOPs.

ERM collected split samples for ATI of all PRI 11 surface soil samples with the excaption of -002, -003, & -005 which are on US Mag property. Jason of ATI provided oversight today of all samples collected on ATI property.

Went to Landfill to meet up with Catherine and ERM drilling crew.

ERM done drilling and now processing last few samples. See Catherine's field notes and sampling data sheets for drilling oversight and split sampling at PRI2-006 and -004

Went to field office to process samples. Samples shipped to KAP, SwRI, and ESAT.

5/8/14 US Mag Phase 1A RI Oversight

Arrived on site at 8:00am.
Met with ERM soil sampling team, Chris and Trent. They are planning on collecting remaining surface soil samples in PRI2 and PRI8.
Went to Landfill to collect surface soil samples at subsurface locations.
ERM collected surface soil sample PRI2-009-SS01-050814. 5 hand auger aliquots taken around boring. Soil is ~90% rust colored soil and ~10% black and grey colored soil.
Weather is clear, with light west wind and temp is 48°F.
ERM collected surface soil sample PRI2-006-SS01-050814. 5 hand auger aliquots taken around boring. Soil is 100% rust colored soil (gypsum).
ERM collected surface soil sample PRI2-014-SS01-050814. 5 hand auger aliquots collected around boring. Soil was rust colored with some gravel.
Went to Angel Wing in PRI 8 to collect surface soil sample PRI8-005. ERM can not collect -005 from original

5/8/14

proposed location due to depth of water, so they are collecting 2 samples at the nearest shoreline which is the SW corner of the ponded water in the Angel Wing. One sample (PRI8-005A) will be collected right at the shoreline, and the other sample (PRI8-005B) will be collected near the perimeter of wastewater impact.
Many birds observed in and around the ponded water in the Angel Wing.
ERM collected surface soil sample PRI8-005A-SS01-050814. Sample loc. stake is 2' from water. Depth to GW in auger holes is 0-1.5". Original -005 stake is ~150' NE of -005A stake. Soil is saturated so ERM collected VOC sample. Iron crust at surface and greyish silt and clay beneath. ~90% passed through 1/4" sieve, some salt nodules.
GPS Coords 4533121 N 353311 E
ERM collected surface soil sample PRI8-005B-SS01-050814 and PWT collected EPA split sample PRI8-05B-SS01-050814-ES01. See field data sheet.

5/8/14

Phase 1A RI solids and water sampling is now considered complete.

Went to field office to process samples.

Samples shipped to KAP, SwRI, and ESAT, and hand delivered to ALS.

CATHERINE LECOURS

Logbook

US Magnesium
Book 1

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ALL-WEATHER
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CATHERINE LECOURS
P.W.T
(406) 457-5495
54 N. LAST CHANCE GULCH
HELENA MT 59601

May 5, 2014

0815 Aaron Baird pick up Catherine LeCours at hotel. Proceed to pick up ice and go to Muscrat Station for supplies.

0950 Arrived at US Mag - short site tour.

1030 C.L. attended US Mag safety mtg

notes taken in Aaron's field book. CL

MAY 6, 2014 Sunny warm windy turned to rain

0800 met at ERM field crew. Attended ATI safety visitor orientation.

Aaron and Chris (ERM) to ERM trailer to set up for ATI sampling.

C.L w/ K. Lundmark for drilling.

0920 arrive at PRI02-009 donned respirators - Cl around 0.5 ppm so just kept them on. first 10 feet of run with little recovery due to plug

L. Mercer asked for 2 foot runs to increase recovery - CL from driller

First Sample 0.5 - 2 ft bgs · plug at 2-3 feet. Discussed with Lonnie - target layers for samples not 2' strickly. Rubber and metal in recovery and wood

~~PRI2-009-0.5-050614~~ CL PRI2-009 from 0.5 to 2 ft bgs collected

not sample asphalt plug. next interval 10' to 12' bgs. PID readings 9.2 - 20.0 ppm

Driller indicated native interface 28.5 bgs - confirmed with bagged recovery tight clay. PRI02-009-SB03-28.5-050614 with PWT split ES01. 1040AM

PID - 28' - 6.2, 29' - .9, 30' - 4.6 ppm

NOTE: SAMPLES FROM 5-5-14, PRI10-008 ~~was~~ were erroneously labled as SS and not SB.

1230 K. Lundmark + C. LeCours left PRI2 for tour.

1515 C. LeCours at ERM trailer - storm and lightening - no more drilling.

Drillers did not start at any other hole. A. Baird collected 2 splits at ATI.

PRI2-009 Collected today:

SB01	.5 to 2'	915	
SB02	10-12'	1015	
SB03	28.5-30.5	1040	← PWT SPLIT
SB04	26-28	1100	
SB05	12-14	1200	recovery from 23-26
SB06	14-18	1230	was mostly wood -
SB07	18-20	1245	no sample
SB08	21-23	1310	

1730 left Muscrat to ship 4 coolers w/ 4 samples

end of day

CL

5.6.14

2 Cold Cloudy Windy

5/8/14 0800 arrive at ERM trailer for schedule A. Baird to go with Trent to ATI L. Mercer, Chris and Catherine w/ drillers to landfill. ERM said after PWT left on Tuesday the storm broke enough to drill 20' into PR1-2-006 and collected 4 samples. ERM to complete the boring this morning with PWT Split, then move over a few feet and re-drill the first 20' for PWT to observe.

0945 collected sample from 20-22' STEADY RAIN
donned respirators

1030 rain broke and finished drilling PR12-006. Drill rig moved two times to re-drill top 20' and hit refusal at approx 10 bgs.

PR1-02-006

0.5-2 bgs	SB01	1615	Gypsum to 1 ft sandy gravel to 2	
2-5 bgs	SB02	1625	clay silt	
5-10 bgs	SB03	1635	little recovery at lower end smut	
10-11	Pushed but no recovery - hit metal			
11-17 bgs	SB04	1700	silty gravel / debris / only 50% recovery	
17-20 bgs	~~SB05~~	no SAMPLE	silty gravel + debris - no fines to sample	

MAY 4, 2014

Starting May 7, 2014 -

20-22 bgs	SB05	945	silty gravel	
22-24 bgs	SB06	1000	silty gravel	~~PWT~~
24-26 bgs	SB07	1020	smut	PWT Split

ERM PR12-006-SB07-24-050714

PWT PR12-06-SB07-24-050714-ES01

26 bgs no sample clay gravel bottom of waste
27-29 bgs SB08 1035 clay sand

27' bgs interface between waste and native
raining again removed respirators

NOON located and started at PR12-014 PID not working - too wet

~~0.5-3 comp material 3-10 bgs~~

1330 collected split PR12-014-SB03-10-050714-ES01
material from 10-20 bgs was consistent salt / iron with sa
a single sample was composited from 10-20 bgs
~~and~~ drillers put casing in hole - outside edge of samples was clay

1420 ~~at left to find A. Baird~~ A Baird at landfill
C. left with T. Hamada to locate PR18-005A and B
A. Baird stayed with drilling. Native encountered at 31' bgs.

NOTE: PR18-005 still under water so located two additional samples ~~to include~~ 005A to be as close to the ~~primary location~~ original location as possible and 005B is at the outer edge of the historical high water mark - both are S.W. of original location

C. LeCours returned to drilling - reached native at 31' bgs

5-7-14

.5 - 2 bgs	SB01	1230	cap
3 - 10 bgs	SB02	1240	Sandy gravel ~ pink salty
10 - 20 bgs	SB03	1330	same as 3-10 salt waste PWT Split
20 - 22	no recovery		
22 - 27	SB04	1415	salt waste
27 - 30	SB05	1420	salt waste
30 - 31	SB06	1500	~~fine~~ silty clay - waste?
31 - 33	SB07	1510	native
33 - 35	no sample - sandy clay		

Photolog:

5/5/14

6 - 11:54 Sonic drill rig
7 - 13:07 Collection of core in sleeve
8 - 13:08 set up at PRI10-008 looking NW
9 - 13:08 set up at PRI10-008 looking west
10 - 13:09 PRI10-008 looking ~~northwest~~ west
12 - 1316 Bentonite chips bag
13 - 1334 PRI10-008 2.5-5.0
14 - 1344 PRI10-008 5.0 - 7.5
~~15 - 1454~~
~~16 -~~ A. BARD Log Book
~~17 -~~
18 - 1522 } PRI10-008 7.5-10'
19 - 1522

~~5/6/14~~
~~20 950~~

5/7/14 930 set up at PRI2-006 Photo 36
37 - 938 20-22 bgs PRI2-006
40 - 943 PRI2-006 20'-22'
41 - 1000 PRI2-006 22-24'
42 1025 PRI2-006 24-26
43 1040 PRI2-006 27-29
~~44 1146~~
47 1221 PRI2-014 0-2'
48 1227 PRI2-014 2-4'
49 1329 PRI2-014 3-10' homogonized
50 1421 PRI2-014 10-20'
51 1422 PRI2 014 10-20'
52 1500 PRI8 - birds
53 1500 PRI8-005 location

4 5-7-14

54 - 1502 PR18-005 A with 005 in background
55 - 1504 PR18-005 B with 005 A and 005 in background
56 - 1528 PR12-014 31-33
1740 left Muscat for airport and end of trip.

5

5-7-14

ROBERT HOWE

Logbook

10-10-2012

Sample ID: DMA-sed-PR114-ES-SS-14001

Sample Location: Same as wtr. Sample was collect from off the front of the Pelecan Boat (Mud w/tight augers)

Sampling: Auger was used initially w/good success. Coring devices were not successful, poor penetration and recoveries.

Sample Description: Black organic rich sand with distinct rotten egg odor, Well sorted sand (100%) medium to fine grain size

Sample Processing: Sample passed easily through sieve with no issues or course particles. Salt crystal layer found even beneath the water.

Well Installation 12/2/2013
Phase 1A RI

Location MW-17 - Foot of landfill in PR1-6

Wrong sand brought to site so lithology was logged at this location Lithology was generally consistent with that presented in the ERM mod 14C-2-13.1 dated August 2013 revision 0 on page 2. Break from clay to oolitic sand slightly higher than predicted by half a foot at depth of 8 ft bgs. ERM logging practices or observations for lower sand slightly different from what had been performed. Instead of calling lower sand SM they are calling it sp/sm. No apparent odor or staining present in the core sample. See Fig 14-16c

Location MW-19B - Foot of landfill in PR1-6

lithology only logged at this location to a depth of 25'. At this deep the rig experience refusal due to flowing sands. Lithology generally consistent with that shown on the ERM mod referenced above except a hard pan slightly off colored darker brown layer was observed in the otherwize oolitic sand layer. Oolitic sand is generally light tan to white with nodules. ERM has proposed to use a dual tube approach and prepacked well to reach the required depth. A mod will be needed to get approval from

EPA prior to installation. see figure 14-16c

Robert Howe 12-3-2013

Location MW-18 - West of Plant in SMAT pile see Mod Figure 14-16d. Lithology inconsist w/ that shown in the Mod Figure 14-16d. Two feet of fill at top of boring followed by 7' of ~~oolitic~~ sand/with silt fine grained sand light buff colored. Fat grey clay at 9' bgs and wtr. Four feet of clay found between 9' and 12' bgs. From 12' to 16' light white nodular oolitic sand was present. From 16 ft bgs to 21.5 ft bgs a grey silty sand was present. At 21.5 to 22 ft bgs a clayey dark grey silty/clayey/sand was encountered. ~~looked~~ This lithology looked almost like a clay, but when disagregated it appeared to be composed almost exclusively of silt. Called Andrew Schmidt to confirm proposed change in screened interval from 7 to 17' bgs to btw 12' and 22' bgs. Andrew approved and a field mod was prepared and signed by Aaron Baird in the field.

Problem w/ using Ready Mix Mod was prepared to replace Ready Mix with bentonite chips up to 2' bgs then used ready mix to surface.

Location MW-13 a+b - North end of PR16 Spud w/ hand auger to 4.5' found SP primarily to 2.5 to 3.0' bgs then void space to 4.5' bgs at top of SM? No recovery from 5' to 9' bgs presumably in very soft saturated SM & CL base on small amount of CL found at 9.5 to 10' in core. From 10' to 12' bgs light white oolitic sand with w gravel sized nodules. From approx 12 to 14' bgs brown earthen sand w/some gravel. From 14' to 20' dark grey well sorted fine sand to silt (SM) with large scale reverse grading or generally a fining downward massive sand to silt.

Well MW-13a was completed btw 2' to 7' bgs without issues and had at least 1' of standing wtr in the well immediately after installation. Well MW 13b was installed just south west of MW 13a. MW13b was completed btw 9' and 19' bgs with 10' of screen. Wells completed and concrete (ready mix set)

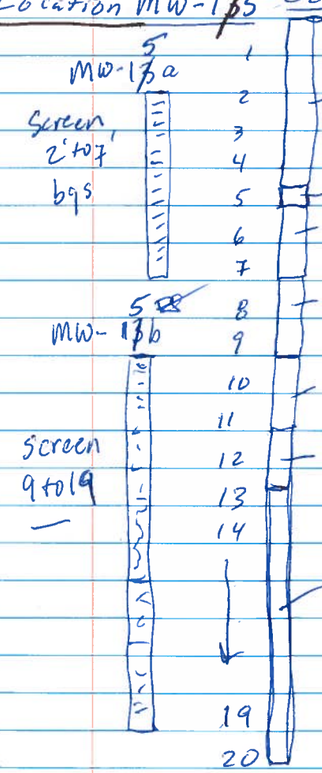
Location MW-14 - east shore of PR16 ponded waste lagoon 200' west of Isthmuse road. 300 pm hand augered well in SP oolitic sand to 3' then encounter thin clay zone from 3' to 5' bgs. Started push with rig btw 5' and 10' bgs with no recovery between 5' to ~~8~~ 7.5' bgs

Wednesday
12-4-2013

7.5' to 11' bgs SP oolitic sand was recovered. From 11.5 to 12.5 was and earthen brown sand poorly sorted w/ clay and silt. From 13 to 20 sm fine dark sand w/ some silt no gravel.

Thursday
12-5-2013

Location MW-15 Geology



Made corrections above to reflect well designation as MW-15A and B instead of MW-13A & B as recorded

12-5-2013
Thursday

Geology and screened intervals as shown on adjacent page. Geology rerun using larger sleeve based on poor recoveries btw 5 and 9 feet bgs. Able to improve recoveries and get full recoveries. Complex sequence of clays and Oolitic sands observed to depth of 12 to 13' bgs. Screens to be set as ~~shown~~ proposed in mod from 2' to 7' bgs for MW15a and 9' to 19' bgs for MW15b. Wells completed and finished as proposed.

Location MW-20 12-6-2013

Auger by hand to 5' in mixture of oolitic and fine light colored sand. Top 1/2' included some gravel fill. Jean tan colored clay encountered at 8.5 feet extending to 13' bgs. Water at near top of clay @ 8.5'. Oolitic light colored sand found at 13' to 17' bgs. From 17' to 28.5' fine dark colored silty sand (fine) to direct push refusal at 28.5' bgs. Drilled w/ augers to 30' and circulated looked for color change that might correspond to MH/CL. No such evidence was found. ERM to note any color change when augers are removed as an indication of tagging expected

of flowing sands anthorize use of prepacked well. Screens were adjusted slightly based on geology. Shallow well screened below clay layer from 12' to 17' bgs. Deeper well completed btw 19 and 29' bgs. Extra sand placed around pre-packed well to the degree plausible.

APPENDIX B
SPLIT SAMPLING FIELD DATA SHEETS

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 1/8/14 **Sample Time:** 10:40

EPA Split Sample ID: PRI2-03-SS01-010814-ES01

US Mag Paired Sample ID: PRI2-003-SS01-010814 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4531173 N 354238 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, steel spoon, steel tray

Sample Location Description: PRI-2, Landfill, ~~eas~~ western area of Landfill, flat graded area

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Rust

Foreign Material Present: — Other: Oolitic sand

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: ~~Sandy silt~~ Silty sand, some gravel

Notes:
Top 2" of soil was frozen, some frozen pieces did not pass through sieve, 95% passed through sieve. 4" of snow on surface. 6 hand auger aliquots used to collect sample.

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-010814-114248-0072, 8-010814-114617-0074, 8-010814-114454-0073, 8-010814-114743-0075, 8-010814-114848-0076

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 1/8/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 5-7-14 **Sample Time:** 1020

EPA Split Sample ID: PR12-06-SB07-24-050714-ES01

US Mag Paired Sample ID: PR12-006-SB07-24-050714 **Sample Interval:** 24-26' bgs

Split Accepted By: C. LeCours **Split Accepted From:** K. Benson

Sample GPS Coordinates: 4531299 N 354367.7 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Sonic drill **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Sieve tray spoon

Sample Location Description: Landfill west

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: grey

Foreign Material Present: none Other: Smut waste

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Smut black w/white specs

Notes: layer of smut waste-like material

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: NA ☒ Other: TBIS

Chain of Custody Number(s): 8-050714-155852-0140, 8-050714-160328-0141, 8-050714-160515-0142, 8-050714-160718-0143, 8-050814-103647-0138

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 5.7.14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5/19/14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 5-6-14 **Sample Time:** 1040 AM

EPA Split Sample ID: PR102-09-SB03-28.5-050614-ES01

US Mag Paired Sample ID: PR102-009-SB03-28.5-050614 **Sample Interval:** 28.5 - 30.5

Split Accepted By: C. LeCours **Split Accepted From:** K. Lundmark

Sample GPS Coordinates: 4531383 NX 354449 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Sonic rig **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: 1/4" sieve, tray, spoon

Sample Location Description: PR102 landfill location 009

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: grey

Foreign Material Present: yes - wood Other: thick clay material

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: clay - native

Notes: thick clay, saturated, just below interface with native material

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: NA ☒ Other: TB14

Chain of Custody Number(s): 8-050614-103050-0135, 8-050614-103353-0136, 8-050614-103534-0137, 8-050614-103822-0139, 8-050814-103647-0138

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 5.6.14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5/19/14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 1/8/14 **Sample Time:** 11:26

EPA Split Sample ID: PRI2-10-SS01-010814-ES01

US Mag Paired Sample ID: PRI2-010-SS01-010814 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4531399 N 354543 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, steel spoon, steel tray

Sample Location Description: PRI-2, Landfill, northeastern area of Landfill, sparse vegetation, 4-6" of snow on surface

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Rust

Foreign Material Present: Plastic bag Other: Plant matter

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Silty sand, some gravel

Notes: In the first 2 auger buckets there was 0.5-1" of black soil at bottom of auger bucket. In the second two, at about 2-3", a black plastic bag (trash bag) was encountered

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-010814-114248-0072, 8-010814-114617-0074, 8-010814-114454-0073, 8-010814-114743-0075, 8-010814-114848-0076

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 1/8/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 5-7-14 **Sample Time:** 1330

EPA Split Sample ID: PR12-14-SB03-10-050714-ES01

US Mag Paired Sample ID: PR12-014-SB03-10-050714 **Sample Interval:** 10-20' bgs

Split Accepted By: C. LeCours **Split Accepted From:** K. Benson

Sample GPS Coordinates: N 4531278.50 E 354588.13 meters

Sample Matrix: [X] Soil [ ] Sed., Exposed [ ] Sed., Saturated [ ] Solid Waste [ ] Surface Water [ ] Wastewater [ ] Groundwater

Sampling Method: Sonic drill **Sample Type:** [X] Grab [ ] Bulk [ ] Composite

Sampling Equipment Used: ¼" sieve, spoon, tray

Sample Location Description: landfill east edge

Sample Observations: Sample Odor: [X] No Odor [ ] Slight Odor [ ] Strong Odor Sample Color: redish pink

Foreign Material Present: none Other: salt waste

Water Sample: Filtered: [ ] Yes [ ] 0.45µm [ ] 0.2µm] [ ] No NA Water Clarity: [ ] Clear [ ] Slightly Turbid [ ] Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: [X] Dry [ ] Moist [ ] Wet Description: Sandy gravel salt waste

Notes: material from 10-20' bgs similar so composited entire interval

Analyses Requested (see COC): [X] VOCs (CLP SOM01.2) [X] SVOCs (CLP SOM01.2) [X] PAHs-SIM (CLP SOM01.2)
[X] Total Metals (CLP ISM01.3) [ ] Diss. Metals (CLP ISM01.3) [ ] Alkalinity (SM2320B) [X] pH (EPA 9045D) [X] TOC (EPA 9060)
[ ] Anions (EPA 300.0) [ ] TDS (SM2540C) [ ] Haloacetic Acids (EPA 552.2) [ ] Hexavalent Chromium (EPA 7199)
[X] Perchlorate (EPA 314/6850) [X] PCBs (CLP CBC01.2) [X] PCDDs/PCDFs (CLP DLM02.2) [ ] Other: _____

QC Samples: [ ] MS/MSD: NA [X] Other: TBIS

Chain of Custody Number(s): 8-050714-155852-0140, 8-050714-160328-0141, 8-050714-160515-0142, 8-050714-160713-0143, 8-050814-103647-0138

Shipment Via: [X] FedEx [ ] Hand Deliver [ ] Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 5.7.14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5/19/14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/25/13 **Sample Time:** 15:00 (start) End= 16:05

EPA Split Sample ID: PRI4-13-SW01-112513-ES01

US Mag Paired Sample ID: PRI4-013-SW01-112513 **Sample Interval:** 0-4"

Split Accepted By: Aaron Baird **Split Accepted From:** Kevin Lundmark

Sample GPS Coordinates: 4531510N 354038E PDOP=1.07

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☒ Wastewater ☐ Groundwater

Sampling Method: Dipper **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, dipper, splitter

Sample Location Description: PRI4, Gypsum Pile, outfall of gypsum slurry pipe. Pipe is discharging subsurface and sample collected in pool directly above pipe.

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Rust

Foreign Material Present: — Other: Warm

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☒ No Water Clarity: ☐ Clear ☐ Slightly Turbid ☒ Turbid

Temp (°~~F~~C): 21.49 DO (mg/L): 3.25 pH (pH units): 5.62 ORP (mV): 33.6

Conductivity (µS/cm): 371 Turbidity (FNU): 3520 1:10 Total Chlorine (mg/L): 0.66

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes:
Attempted to use peristaltic pump but it was clogging with sediment so ERM used dipper method. 0.45 micron filter also clogging and therefore unable to collect field filtered samples.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060)
☒ Anions (EPA 300.0) ☒ TDS (SM2540C) Unpreserved ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: ERM added 10mL NaOH to 500mL CN bottles, pH went from 7 to 9. Added 20mL NaOH to EPA CN bottles (1L), Total CN pH is 10, Diss. CN pH is 5

Chain of Custody Number(s): 8-112613-140621-0021, 8-112613-071309-0017, 8-112513-175020-0015, 8-112513-182541-0016, 8-112613-150028-0022, 8-112513-174703-0014

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/25/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/21/13 **Sample Time:** 12:30 (Start) End = 1:30

EPA Split Sample ID: PRI7-07-SW01-112113-ES01

US Mag Paired Sample ID: PRI7-007-SW01-112113 **Sample Interval:** 6" (13" TD)

Split Accepted By: Aaron Baird **Split Accepted From:** Isaiah Utne

Sample GPS Coordinates: 4532414N 354730 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☒ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, Tygon tubing

Sample Location Description: PRI7, Northeast Ponded Waste Lagoon, western area of PRI at flowing seep approx. 100' E of the isthmus road

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Clear

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°C): 12.1 DO (mg/L): 1.2 pH (pH units): 5.45 ORP (mV): 30

Conductivity (µS/cm): 85.6 Turbidity (FNU): 0.1 Total Chlorine (mg/L): 0.02

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes: ERM added 50mL NaOH to 500mL CN bottles to bring pH up to 10.3. Added 100mL NaOH to 1L EPA CN bottles to bring pH up to 12.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-112113-163553-0006, 8-112613-132050-0019, 8-112113-162753-0005, 8-112513-182541-0016, 8-112113-170656-0008, 8-112113-165728-0007

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/21/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/22/13 **Sample Time:** 12:05 (Start) End = 12:45

EPA Split Sample ID: PRI7-13-SW01-112213-ES01

US Mag Paired Sample ID: PRI7-013-SW01-112213 **Sample Interval:** 2" (TD=4½")

Split Accepted By: Aaron Baird **Split Accepted From:** Isaiah Utne

Sample GPS Coordinates: 4531829N 355396E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☒ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☐ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, Tygon tubing

Sample Location Description: PRI 7, Northeast Ponded Waste Lagoon, western area of PRI at flowing seep approx. 100'E of the isthmus road

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Clear

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°C): 12.49 DO (mg/L): 0.70 pH (pH units): 5.6 ORP (mV): -38

Conductivity (µS/cm): 58.1 Turbidity (FNU): 0.0 Total Chlorine (mg/L): 0.06

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes:
ERM added 15 mL NaOH to 500 mL CN bottles. Added 30 mL NaOH to 1L EPA CN bottles

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☒ MS/MSD: ☐ Other: —

Chain of Custody Number(s): 8-112213-162343-0011, 8-112613-130859-0018, 8-112213-162753-0012, 8-112513-182541-0016, 8-112213-155934-0009, 8-112213-160429-0010

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/22/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/17/13 **Sample Time:** 11:36

EPA Split Sample ID: PRI8-01-SS01-121713-ES01

US Mag Paired Sample ID: PRI8-001-SS01-121713 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: 4533503N 353143E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, steel trowel, steel tray

Sample Location Description: PRI-8, Northwest Lagoon Overflow, vegetated area in NW portion of PRI, undisturbed, ~3" of snow on surface

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Light brown

Foreign Material Present: roots Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Sandy silt, trace clay

Notes:
none

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121713-152225-0057, 8-121713-152849-0059, 8-121713-152548-0058
8-121713-153220-0061, 8-121713-153047-0060

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/17/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 5/8/14 **Sample Time:** 12:11

EPA Split Sample ID: PRI8-05B-SS01-050814-ES01

US Mag Paired Sample ID: PRI8-005B-SS01-050814 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4533081N 353287E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, steel tray

Sample Location Description: PRI8, Northwest Lagoon Overflow, SW corner of Angel Wing about 100' SW of surface water in recently submerged area

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Brown

Foreign Material Present: — Other: Iron staining 0.1-0.5" bgs

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: Clay

Notes:
none

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: NA ☐ Other: NA

Chain of Custody Number(s): 8-050814-084411-0144, 8-050814-084655-0145, 8-050814-084818-0146, 8-050814-084910-0147, 8-050814-103647-0138

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: _____ **Date:** 5/8/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: _____ **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 3/25/14 **Sample Time:** 11:46

EPA Split Sample ID: PRI8-15-SS01-032514-ES01

US Mag Paired Sample ID: PRI8-015-SS01-032514 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4532834 N 353646 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, ¼" sieve, metal spoon, steel tray

Sample Location Description: PRI 8, Northwest Ponded Waste Lagoon Overflow, southern portion of PRI that is central to overflow area

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Greyish brown

Foreign Material Present: — Other: Iron staining at ~2" bgs

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☒ Wet Description: Silty clay, med. plasticity

Notes:
Water encountered in auger holes at 5" bgs. pH of water tested with pH test strips indicated a pH of 7.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-032514-141046-0130, 8-032514-141719-0131, 8-032514-141939-0132, 8-032514-142151-0134, 8-032514-142045-0133

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 3/25/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5/22/14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/19/13 **Sample Time:** 1:17

EPA Split Sample ID: PRI8-16-SS01-121913-ES01

US Mag Paired Sample ID: PRI8-016-SS01-121913 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4532835N 353811E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, metal spoon, steel tray

Sample Location Description: PRI8-Northwest Lagoon Overflow, vegetated area in ~~western~~ SE portion of PRI, ~20' E of eastern edge of wastewater pond

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Brown

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: Sandy silt

Notes: Approx. 6" of snow on surface

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121913-121941-0062, 8-121913-122347-0064, 8-121913-122203-0063
8-122013-082859-0066, 8-122013-082604-0065

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/19/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/16/13 **Sample Time:** SB01-6=12:30 SB02-8=12:40 SB03-10=12:50

EPA Split Sample ID: PRI8-17-SB01-6-121613-ES01, PRI8-17-SB02-8-121613-ES01, PRI8-17-SB03-10-121613-ES01

US Mag Paired Sample ID: PRI8-017-SB01-6-121613, PRI8-017-SB02-8-121613, PRI8-017-SB03-10-121613 **Sample Interval:** 6-8', 8-10', 10-12'

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: 4532654 N 353648 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Direct-push **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Geoprobe 7730DT, 5' sections of 1½" PVC tubes, ¼" sieve, metal spoons, steel trays

Sample Location Description: PRI 8, Northwest Ponded Waste Lagoon Overflow, N side of road that separates PRI 6 from PRI 8, 3 boreholes in triangle pattern 6-8' apart

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: White to gray

Foreign Material Present: — Other: No PID readings

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry, 1-6' ☐ Moist ☒ Wet, 6-12' Description: 0-1' silty sand, 1-1.5 gravelly silt, 1.5-6 silty sand, 6-7.5' silty clay, 7.5-12' silty sand (10-12' most saturated, standing water)

Notes:
6-8' interval is mostly sand with ~2" of first encountered clay at bottom of interval in first core. EnCore samples collected from this clay at ~8' bgs. Unable to fill all jars from same interval, had to split between all 3 intervals. Could only fill pH jar ½ way.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) SB01-6 ☒ SVOCs (CLP SOM01.2) SB01-6 ☒ PAHs-SIM (CLP SOM01.2) SB01-6
☒ Total Metals (CLP ISM01.3) SB03-10 ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) SB02-8 ☒ TOC (EPA 9060) SB03-10
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) SB01-6 ☒ PCBs (CLP CBC01.2) SB03-10 ☒ PCDDs/PCDFs (CLP DLM02.2) SB03-10 ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121613-164050-0052, 8-121613-164434-0053, 8-121613-165657-0056, 8-121613-165053-0054, 8-121613-165320-0055

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/16/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/12/14 **Sample Time:** 11:00

EPA Split Sample ID: PRI8-18-SW01-021214-ES01

US Mag Paired Sample ID: PRI8-018-SW01-021214 **Sample Interval:** 6" (TD=12")

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: Not recorded; approx. 8' N of soil boring PRI8-017

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☒ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, Tygon and PET ½" tubing

Sample Location Description: PRI8, Northwest Ponded Waste Lagoon Overflow, in ponded wastewater on N side of road that separates PRI6 from PRI8

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Yellow

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°~~F~~ C): 9.36 DO (mg/L): 2.86 pH (pH units): 0.70 ORP (mV): 510

Conductivity (µS/cm): 60.1 Turbidity (FNU): 48.1 Total Chlorine (mg/L): 0.08

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes: ERM added 100 drops of NaOH to 500mL CN bottles to increase pH from 1 to 11. Added 200 drops of NaOH to 1L CN bottles to increase pH from 1 to 10.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021214-122926-0084, 8-021214-123411-0086, 8-021214-123225-0085, 8-021214-122618-0083, 8-021214-123733-0088, 8-021214-123600-0087

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/12/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/12/14 **Sample Time:** 14:45

EPA Split Sample ID: PRI8-19-SW01-021214-ES01

US Mag Paired Sample ID: PRI8-019-SW01-021214 **Sample Interval:** 6" (TD=12")

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: 4533279.45m N 353295.50m E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☒ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, ½" Tygon and PET tubing

Sample Location Description: PRI8, in "Angel Wing" of Northwest Ponded Waste Lagoon Overflow, on BLM property, N of PRI8-005 in main surface water body in "Angel Wing"

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Yellow

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°~~F~~ C): 9.53 DO (mg/L): 4.36 pH (pH units): 1.07 ORP (mV): 511

Conductivity (µ~~S~~m/cm): 54.2 Turbidity (FNU): 8.2 Total Chlorine (mg/L): 0.10

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes: ERM added 100 drops of NaOH to 500mL CN bottles to increase pH from 10 to 11.5. Added 200 drops of NaOH to 1L CN bottles to increase pH from 4 to 10.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060)
☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021214-122926-0084, 8-021214-123411-0086, 8-021214-123225-0085, 8-021214-122618-0083, 8-021214-123733-0088, 8-021214-123600-0087

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/12/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 1/6/14 **Sample Time:** 12:04

EPA Split Sample ID: PRI9-02-SS01-010614-ES01

US Mag Paired Sample ID: PRI9-002-SS01-010614 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4531918N 353677E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☒ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, metal spoon, steel tray

Sample Location Description: PRI 9, Smut Area, NE corner of smut piles, 2-4" of snow on most of surface, black and white/gray smut piles

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: 50% Black, 50% white to gray

Foreign Material Present: — Other: 1/2" salt nodules

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: Smut

Notes:
~98% of sample material passed through sieve
9 hand auger holes used to collect enough sample volume for EPA split and ERM fines analysis

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-010614-152224-0067, 8-010614-154934-0069, 8-010614-154608-0068
8-010614-155912-0071, 8-010614-155610-0070

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 1/6/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 1/6/14 **Sample Time:** 10:57

EPA Split Sample ID: PRI9-11-SS01-010614-ES01

US Mag Paired Sample ID: PRI9-011-SS01-010614 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4530965N 353544E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☒ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, metal spoon, steel tray

Sample Location Description: PRI9, Smut Area, SW area of smut piles, low lying area, 2-4" of snow on surface

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: White to gray

Foreign Material Present: — Other: Firm salt nodules, 1/2"

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist (in place) ☒ Wet (post homogenized) Description: Smut

Notes:
~98% of sample material passed through sieve
13 hand auger holes used to collect enough sample volume for EPA split and field duplicate

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☒ Other: PRI9-11-SS01-010614-ES02 Field Duplicate

Chain of Custody Number(s): 8-010614-152224-0067, 8-010614-154924-0069, 8-010614-154608-0068
8-010614-155912-0071, 8-010614-155610-0070

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 1/6/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/20/13 **Sample Time:** 9:57

EPA Split Sample ID: PRI9-14-SS01-122013-ES01

US Mag Paired Sample ID: PRI9-014-SS01-122013 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4531217 N 353803 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☒ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, metal spoon, steel pan

Sample Location Description: PRI-9, Smut Area, between Western Ditch and Central Ditch in southwest corner

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Black

Foreign Material Present: — Other: 5% white smut

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: _____

Notes: 9 hand auger aliquots used to get more volume for ERM field duplicate. 2% hard pieces not passing through sieve. 8" of snow on surface.

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121913-121941-0062, 8-121913-122347-0064, 8-121913-122203-0063
8-122013-082859-0066, 8-122013-082604-0065

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/20/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/12/13 **Sample Time:** 11:57

EPA Split Sample ID: PRI10-03-SS01-121213-ES01

US Mag Paired Sample ID: PRI10-003-SS01-121213 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Trent Hamada

Sample GPS Coordinates: 4532542N 353132E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, steel tray

Sample Location Description: PRI10, Barium Sulfate Area, west side of PRI, graded area, little vegetation

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Brown

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Sandy silt, some clay

Notes:
Sample collected from 7 hand auger holes in a circular pattern

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☒ Other: Duplicate PRI10-03-SS01-121213-ES02

Chain of Custody Number(s): 8-121213-084136-0047, 8-121213-084623-0049, 8-121213-084623-0048
8-121213-084909-0051, 8-121213-084745-0050

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/12/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 05-05-14 **Sample Time:** 14:00

EPA Split Sample ID: PRI10-DB-SB04-6-050514-ES01

US Mag Paired Sample ID: PRI10-DDB-SB04-6-050514 **Sample Interval:** 6.0-7.5 ft bgs

Split Accepted By: A. Baird **Split Accepted From:** L. Mercer

Sample GPS Coordinates: N-4532670 E 353263

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: sonic drill **Sample Type:** ☒ Grab ☐ Bulk ~~☒ Composite~~

Sampling Equipment Used: core sleeve (plastic) 1/4" sieve steel tray + spoon

Sample Location Description: PRI10 barium sulfate area north central portion

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: light grey

Foreign Material Present: none Other: 1/4"-1" ~~rock~~ gravel

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☒ Wet Description: 6-7½' Gravel, trace sand

Notes: 7.5' bgs native interval
groundwater at 2.5' bgs

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: none ☒ Other: TB-14

Chain of Custody Number(s): 8-050614-103050-0135, 8-050614-103353-0136, 8-050614-103534-0137, 8-050614-103822-0139, 8-050814-103647-0138

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 5/5/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5·22·14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/12/13 **Sample Time:** 3:05

EPA Split Sample ID: PRI10-13-SS01-121213-ES01

US Mag Paired Sample ID: PRI10-013-SS01-121213 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Trent Hamada

Sample GPS Coordinates: 4532617N 353440E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, metal spoon, steel tray

Sample Location Description: PRI 10, Barium Sulfate Area, southeast corner of PRI, in vegetated area near ponded wastewater to the south

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Brown

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: Silty clay, trace fine sand

Notes: None

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121213-084136-0047, 8-121213-084623-0049, 8-121213-084623-0048
8-121213-084909-0051, 8-121213-084745-0050

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/12/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 5/6/14 **Sample Time:** 11:35

EPA Split Sample ID: PRI11-11-SS01-050614-ES01

US Mag Paired Sample ID: PRI11-011-SS01-050614 **Sample Interval:** 0-2"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4530165 N 353388 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Scoop **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Flat bottom scoop, 1/4" sieve, steel tray

Sample Location Description: PRI 11, ATI Titanium Plant, south of ATI in greasewood shrub area, in disturbed area where underground line is located

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: light grey

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Silt

Notes: 5 scoops with 4"x6"x2" dimensions. 99% of sample volume passed through 1/4" sieve. No vegetation in sample aliquots.

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☐ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: NA ☐ Other: NA

Chain of Custody Number(s): 8-050614-103050-0135, 8-050614-103353-0136, 8-050614-103534-0137, 8-050614-103822-0139, 8-050814-103647-0138

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 5/6/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 5/6/14 **Sample Time:** 12:40

EPA Split Sample ID: PRI11-03-SS01-050614-ES01

US Mag Paired Sample ID: PRI11-003-SS01-050614 **Sample Interval:** 0-2 in

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4530611 N 353703 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Scoop **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Flat bottom scoop, 1/4" sieve, steel tray

Sample Location Description: PRI11, US Mag. equipment staging area, flat graded area, between steel framing

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: light brown

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Silt, trace gravel

Notes:
5 scoops with 4"×6"×2" dimensions. 95% of sample volume passed through 1/4" sieve. No vegetation in area.

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: NA ☐ Other: NA

Chain of Custody Number(s): 8-050614-103050-0135, 8-050614-103253-0136, 8-050614-103534-0137, 8-050614-103822-0139, 8-050814-103647-0138

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 5/6/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5·22·14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/10/13 **Sample Time:** 9:34

EPA Split Sample ID: PRI12-02-SS01-121013-ES01

US Mag Paired Sample ID: PRI12-02-SS01-121013 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Trent Hamada

Sample GPS Coordinates: 4530468 N 354174 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, steel tray

Sample Location Description: PRI12, Ancillary Worker Exposure Area, south of Hill Bros, vegetated area

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Brown

Foreign Material Present: — Other: plant material

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Sandy silt, little 1/2" gravel

Notes: ~4" of snow on surface

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121013-081842-0038, 8-121013-081945-0040, 8-121013-081918-0039
8-121013-082033-0041, 8-121013-082131-0042

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/10/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/10/13 **Sample Time:** 12:01

EPA Split Sample ID: PRI12-10-SS01-121013-ES01

US Mag Paired Sample ID: PRI12-010-SS01-121013 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Trent Hamada

Sample GPS Coordinates: 4530716 N 354836 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☒ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, steel tray

Sample Location Description: PRI12, Ancillary Worker Exposure Area, in salt piles southeast of the star pond

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Light brown

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: Salt

Notes: 7 hand auger holes used to get extra sample volume for EPA ~~slip~~ split and ERM fines analysis

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121013-081842-0038, 8-121013-081945-0040, 8-121013-081918-0039, 8-121013-082033-0041, 8-121013-082131-0042

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/10/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/6/13 **Sample Time:** 12:34

EPA Split Sample ID: PRI13-03-SS01-120613-ES01

US Mag Paired Sample ID: PRI13-003-SS01-120613 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: 4533331N 355386E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, metal spoon, steel tray

Sample Location Description: PRI 13, Buffer Area North, in mud flat area N of PRI 7, no vegetation, covered with 1-2" of snow

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Brown

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☒ Moist ☐ Wet Description: Clay (0-5") Gravelly sand (5-6")

Notes:
none

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-120513-095628-0033, 8-120513-095914-0035, 8-120513-095807-0034
8-120513-100017-0036, 8-120513-100115-0037

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/6/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/6/13 **Sample Time:** 9:45

EPA Split Sample ID: PRI13-12-SS01-120613-ES01

US Mag Paired Sample ID: PRI13-012-SS01-120613 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: 4532295N 356904E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, ~~#~~ steel tray

Sample Location Description: PRI 13, Buffer Area East, in raised, vegetated area 2-3" of snow on surface

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Light brown

Foreign Material Present: — Other: Some caliche on surface

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Silty sand

Notes:
none

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-120513-095628-0033, 8-120513-095914-0035, 8-120513-095807-0034
8-120513-100017-0036, 8-120513-100115-0037

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/6/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/16/13 **Sample Time:** SB03-4 = 10:30, SB02-2 = 10:40

EPA Split Sample ID: PRI14-OS-SB03-4-121613-ES01 and PRI14-OS-SB02-2-121613-ES01

US Mag Paired Sample ID: PRI14-OOS-SB03-4-121613, PRI14-OOS-SB02-2-121613 **Sample Interval:** 0.5-2, 2-4, 4-6 ft

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: New sample location not GPS'd at time of sampling

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Direct-push **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Geoprobe 7730DT, 1½" PVC tubes, ¼" sieve, metal spoons, steel trays

Sample Location Description: PRI 14, Buffer Area South, in salt flat with frozen surface water and salt crust. 3 borings spaced 6-8" apart advanced ~5' E of location stake.

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: 0-0.5' = Black, 0.5-1.5' = gray, 1.5-6' = white to gray

Foreign Material Present: — Other: No PID readings

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☒ Wet Description: 0-0.5' = Sandy silt, 0.5-1.5' = Clayey silt, 1.5-3' = Silty sand, 3-6' = Gravelly sand

Notes:
EnCore samplers collected from 5½'-6' in silty sand from first core.
Perchlorate aliquot collected from SB02-2, all other sample aliquots collected from SB03-4

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) SB02-2 ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121613-164434-0053, 8-121613-164050-0052, 8-121613-165053-0054, 8-121613-165657-0056, 8-121613-165320-0055

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/16/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/11/13 **Sample Time:** 9:44

EPA Split Sample ID: PRI14-OS-SS01-121113-ES01

US Mag Paired Sample ID: PRI14-OOS-SS01-121113 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Trent Hamada

Sample GPS Coordinates: New sample location not GPS'd at time of sampling

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☒ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, 1/4" sieve, metal spoon, steel tray

Sample Location Description: PRI14, Buffer Area South, augers collected around steel pans placed for surface water sample collection

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Black

Foreign Material Present: — Other: salt

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☒ Wet Description: Sandy silt, salt crust at surface

Notes: Approx. 2" of ice (frozen surface water) above surface sediment. New sample location is ~8' WSW of original location. Ice removed from auger as much as possible before sieving. 7 hand auger locs. used.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-121113-085353-0043, 8-121113-123014-0045, 8-121113-085819-0044, 8-121013-082033-0041, 8-121113-123403-0046

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/11/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/11/14 **Sample Time:** 14:20

EPA Split Sample ID: PRI14-05-SW01-021114-ES01

US Mag Paired Sample ID: PRI14-005-SW01-021114 **Sample Interval:** 2" (~3" TD in bowl)

Split Accepted By: Aaron Baird **Split Accepted From:** Kevin Lundmark

Sample GPS Coordinates: See PRI14-05-SS01; SW01 is ~3' E of SS01

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☒ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, ½" Tygon and PET tubing

Sample Location Description: PRI 14, Buffer Area South, collected from steel bowl, surrounding surface water is ~½" deep with a slow easterly flow

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Clear, rust with initial turbidity

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☐ Clear ☒ Slightly Turbid ☐ Turbid

Temp (°~~F~~C): 11.70 DO (mg/L): 3.54 pH (pH units): 5.98 ORP (mV): -57

Conductivity (~~µ~~mS/cm): 69.5 Turbidity (FNU): >1000 Total Chlorine (mg/L): 0.11

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes: ERM added 100 drops of NaOH to 500mL CN bottles to increase pH from 11 to 12. Added 200 drops of NaOH to 1L CN bottles to increase pH from ~7 to 11.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021114-133215-0078, 8-021114-164956-0080, 8-021114-163323-0079, 8-021214-122615-0083, 8-021114-175116-0082, 8-021114-165739-0081

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/11/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/11/13 **Sample Time:** 10:20

EPA Split Sample ID: PRI14-06-SS01-121113-ES01

US Mag Paired Sample ID: PRI14-006-SS01-121113 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Trent Hamada

Sample GPS Coordinates: 4530641 N 355773 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☒ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, steel tray,

Sample Location Description: PRI 14, Buffer Area South, approx. 100' ~~[illegible]~~ South of N shore of ponded, non-vegetated area, salt flat

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Black

Foreign Material Present: — Other: Salt

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☒ Wet Description: Sandy silt, salt crust at surface

Notes: ~1½" of ice (frozen surface water) above salt crust at surface
9 EnCore samplers filled. Black silty sediment used to fill EnCores rather than the light brown salt crust material

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☐ SVOCs (CLP SOM01.2) ☐ PAHs-SIM (CLP SOM01.2)
☐ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☐ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☐ Perchlorate (EPA 314/6850) ☐ PCBs (CLP CBC01.2) ☐ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☒ MS/MSD: PRI14-06-SS01-121113-ES01 ☐ Other: —

Chain of Custody Number(s): 8-121113-085353-0043

Shipment Via: ☒ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/11/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 12/3/13 **Sample Time:** 14:25

EPA Split Sample ID: PRI14-06-SS01-120313-ES01

US Mag Paired Sample ID: PRI14-006-SS01-120313 **Sample Interval:** 0-6"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4530641 N 355773 E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☒ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Hand auger **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Hand auger, metal spoon, steel tray

Sample Location Description: PRI 14, Buffer Area South, in saturated salt crusted area adjacent to channel with flowing surface water, no vegetation

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: Grey

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☒ Wet Description: Sandy silt

Notes:
Salt crust on the surface is not breaking up and passing through the sieve very well, most is thrown out

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☒ MS/MSD: _____ ☐ Other: —

Chain of Custody Number(s): 8-120313-154215-0023, 8-120313-163236-0025, 8-120313-162444-0024, 8-120313-164642-0027, 8-120313-164515-0026

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 12/3/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5-22-14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/19/13 **Sample Time:** 14:53 (Start) End=16:13

EPA Split Sample ID: PRI14-08-SW01-111913-ES01

US Mag Paired Sample ID: PRI14-008-SW01-111913 **Sample Interval:** 2" (TD=4")

Split Accepted By: Aaron Baird **Split Accepted From:** Isaiah Utne

Sample GPS Coordinates: 4529966N 356473E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☒ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter

Sample Location Description: PRI14, Buffer Area South, in largest ponded water body in that section of PRI14, about 500' N of access road

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Clear

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°~~F~~ C): 7.76 DO (mg/L): 2.35 pH (pH units): 6.48 ORP (mV): 207

Conductivity (µS/cm): 568 1:10 Turbidity (FNU): 0.0 Total Chlorine (mg/L): 0.0

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes:
Could not accompany ERM to sample location, had to observe from shoreline. ERM used boat and waders to access sample location.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-112013-141254-0001, 8-112613-071309-0017, 8-112013-170552-0004, 8-112513-182541-0016, 8-112013-172719-0005, 8-112013-162234-0003

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/19/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/19/13 **Sample Time:** 11:05

EPA Split Sample ID: PRI14-13-SW01-111913-ES01

US Mag Paired Sample ID: PRI14-13-SW01-111913- **Sample Interval:** 1-2"

Split Accepted By: Aaron Baird **Split Accepted From:** Isaiah Utne

Sample GPS Coordinates: 4530975 N 357020 E PDOP 1.06 ± 20'

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☒ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, Horiba

Sample Location Description: PRI14, Buffer Area South, NE corner in standing water

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Clear

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No (ERM unable to use 0.2µm filter) Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°C): 7.11 DO (mg/L): 2.30 pH (pH units): 6.90 ORP (mV): 175

Conductivity (µS/cm): 516 (1:10) Turbidity (FNU): 0.6 Total Chlorine (mg/L): 0.14

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes:
Sample location moved ~200' N of original/proposed location to the nearest surface water that was deep enough (>2") to sample

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-112013-141254-0001, 8-112613-132050-0019, 8-112013-170552-0004, 8-112513-182541-0016, 8-112013-172719-0005, 8-112013-162234-0003

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/19/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/24/13 **Sample Time:** 8:45

EPA Split Sample ID: PRI15-02-SS01-112413-ES01

US Mag Paired Sample ID: PRI15-002-SS01-112413 **Sample Interval:** 0-2"

Split Accepted By: Aaron Baird **Split Accepted From:** Isaiah Utne

Sample GPS Coordinates: 4534541N 352447E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Scoop **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Flat-bottom scoop, 1/4" sieve, tray

Sample Location Description: PRI15 NNW of plant, flat, vegetated

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Light brown

Foreign Material Present: — Other: —

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Clayey silt, some small gravel & salt nodules

Notes: Scoops were approx. 4" x 4" x 2" deep

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-112613-140621-0021, 8-112613-132050-0019, 8-112613-135730-0020
8-112513-182541-0016, 8-112213-155934-0009

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/24/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/24/13 **Sample Time:** 9:52

EPA Split Sample ID: PRI15-10-SS01-112413-ES01

US Mag Paired Sample ID: PRI15-010-SS01-112413 **Sample Interval:** 0-2"

Split Accepted By: Aaron Baird **Split Accepted From:** Isaiah Utne

Sample GPS Coordinates: 4528079N 353726E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Scoop **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Flat bottom scoop, 1/4" sieve, tray

Sample Location Description: PRI15, at edge of flat to raised area, mounding, surrounded by greasewood shrubs, south of plant

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Light brown

Foreign Material Present: — Other: Black lichen, evaporite

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Clayey silt

Notes: Soil was dense, possibly frozen, black lichen on soil surface and some grass

Scoops were approx. 4"x4" x 2" deep

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-112613-140621-0021, 8-112613-132050-0019, 8-112613-135730-0020
8-112513-182541-0016, 8-112213-155934-0009

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/24/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/20/13 **Sample Time:** 9:27

EPA Split Sample ID: PRI16-04-SS01-112013-ES01

US Mag Paired Sample ID: PRI16-004-SS01-112013 **Sample Interval:** 0-2"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4530626N 348572E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Scoop **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Flat bottom scoop, 1/4" sieve, steel tray

Sample Location Description: PRI16, Lakeside Mountain Buffer Area, on steep face near base of first ridge below rock outcrop, rocky/grassy surface

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Grayish brown

Foreign Material Present: — Other: Roots

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Clayey silt, some small gravel

Notes:
Scoops were approx. 4"x4"x2" deep

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-112013-160831-0002, 8-112013-170552-0004, 8-112513-182541-0016
8-112013-172719-0005

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/20/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 11/20/13 **Sample Time:** 10:40

EPA Split Sample ID: PRI16-08-SS01-112013-ES01

US Mag Paired Sample ID: PRI16-008-SS01-112013 **Sample Interval:** 0-2"

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4528110N 351162E

Sample Matrix: ☒ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☐ Groundwater

Sampling Method: Scoop **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Flat bottom scoop, 1/4" sieve, steel tray

Sample Location Description: PRI16, Lakeside Mountain Buffer Area, west of plant, approx. 50' up initial slope from valley floor, rocky/grassy surface

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: Light brown

Foreign Material Present: — Other: Dense roots from grass

Water Sample: Filtered: ☐ Yes [☐ 0.45µm ☐ 0.2µm] ☐ No NA Water Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°F): _____ DO (mg/L): _____ pH (pH units): _____ ORP (mV): _____

Conductivity (µS/cm): _____ Turbidity (FNU): _____ Total Chlorine (mg/L): _____

Soil Sample: Moisture Content: ☒ Dry ☐ Moist ☐ Wet Description: Clayey silt, trace small gravel

Notes:
None

Analyses Requested (see COC): ☐ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☐ Diss. Metals (CLP ISM01.3) ☐ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☐ Anions (EPA 300.0) ☐ TDS (SM2540C) ☐ Haloacetic Acids (EPA 552.2) ☐ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☒ MS/MSD: _____ ☐ Other: —

Chain of Custody Number(s): 8-112013-160831-0002, 8-112013-170552-0004, 8-112513-182541-0016
8-112013-172719-0005

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 11/20/13

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/13/14 **Sample Time:** 09:40

EPA Split Sample ID: MW-18-01-021314-ES01 and -ES02

US Mag Paired Sample ID: MW-18-01-021314 **Sample Interval:** ~17 ft btoc

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4530914 N 353648 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☒ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, 1/2" silicon & PET tubing, water level & quality meters

Sample Location Description: PRI 9, Smut Area, SE corner of smut piles, adjacent to N side of Plant

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: None

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (~~°F~~ °C): 17.03 DO (mg/L): 0.0 pH (pH units): 7.40 ORP (mV): 103

Conductivity (µS/cm): 28.8 Turbidity (FNU): 8.0 Total Chlorine (mg/L): 0.07

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes: Well TD = 22 ft bgs, Screen Interval = 12-22 ft bgs, DTW = 14.00 ft btoc purge flow rate = 1100 mL/min, no drawdown. 6 gal. purged prior to sampling. ERM initial pH = 10.5, 50 drops NaOH added, final pH = 12. EPA initial pH is 10, 100 drops added, final pH is 11.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☒ Other: field dup. -ES02

Chain of Custody Number(s): 8-021314-143444-0089, -163507-0090, -170243-0092, -164602-0091, -173145-0095, -173658-0116, -171323-0113

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: Aaron Baird by [illegible] **Date:** 5.22.14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [illegible] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/14/14 **Sample Time:** 10:20

EPA Split Sample ID: MW-19A-01-021414-ES01

US Mag Paired Sample ID: MW-19A-01-021414 **Sample Interval:** ~14 ft btoc

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: 453342.96 N 354750.29 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☒ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, 1/2" Silicon & PET tubing, water level & quality meter

Sample Location Description: PRI 5, Southeast Ponded Waste Lagoon, at western edge of ponded wastewater in PRI 5, E of S side of Landfill, northern completion of paired wells

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: None

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°C): 13.01 DO (mg/L): 0.00 pH (pH units): 7.07 ORP (mV): -250

Conductivity (µS/cm): 171 (10x dilution) Turbidity (FNU): 0.0 Total Chlorine (mg/L): 0.08

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes:
Well TD = 19.5 ft btoc, screen interval = 9-19 ft btoc, DTW = 3.30 ft btoc, purge flow rate = 1800 mL/min, no drawdown. ~8.5 gal purged prior to sampling. ERM initial CN pH is 11, 50 drops NaOH added, final pH is 12. EPA initial CN pH is 7, 100 drops added, final pH is 8. CR6 pH is 6.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021414-151021-0122, 8-021414-150914-0121, 8-021414-150819-0120, 8-021414-154840-0118, -150629-0119, -145407-0117

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/14/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/14/14 **Sample Time:** 13:10

EPA Split Sample ID: MW-19B-01-021414-ES01

US Mag Paired Sample ID: MW-19B-01-021414 **Sample Interval:** ~30 ft btoc

Split Accepted By: Aaron Baird **Split Accepted From:** Lonnie Mercer

Sample GPS Coordinates: 4531342.96 N 354750.29 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☒ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, ½" silicon and PET tubing, water level meters, gal.

Sample Location Description: PRI 5, Southeast Ponded Waste Lagoon, at western edge of ponded wastewater in PRI 5, E of S side of Landfill, southern completion of paired wells

Sample Observations: Sample Odor: ☐ No Odor ☐ Slight Odor ☒ Strong Odor Sample Color: None

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°~~F~~ C): 15.89 DO (mg/L): 0.00 pH (pH units): 8.21 ORP (mV): -409

Conductivity (µS/cm): 83.3 Turbidity (FNU): 0.0 Total Chlorine (mg/L): 0.02

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes:
Well TD = 35.5 ft btoc, screen interval = 25-35 ft btoc, DTW = 2.52 ft btoc, pump flow rate set at 800 mL/min, no drawdown. ERM initial CN pH is 12, no add. preservative added. CR6 pH is 8.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060)
☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other: _____

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021414-151021-0122, -150914-0121, -150819-0120, -154840-0118, -150629-0119, -145407-0117

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/14/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/17/14 **Sample Time:** 9:15

EPA Split Sample ID: LF-01-01-021714-ES01

US Mag Paired Sample ID: LF-01-01-021714 **Sample Interval:** ~15' btoc (5' from btm)

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 4531179 N 354374 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☒ Groundwater

Sampling Method: Low-flow purge **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, ½" silicon and PET tubing

Sample Location Description: PRI2, Landfill, south of raised Landfill area, adjacent to road that runs between the Landfill and the Star Pond

Sample Observations: Sample Odor: ☐ No Odor ☒ Slight Odor ☐ Strong Odor Sample Color: None

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°C): 14.48 DO (mg/L): 0.0 pH (pH units): 7.17 ORP (mV): -97

Conductivity (µS/cm): 114.0 Turbidity (FNU): 5.1 Total Chlorine (mg/L): 0.00

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes: Well TD is 20.27. Screen is 5.8-15.8. DTW is 8.11' btoc. Purge flow rate is 1800 mL/min. No drawdown. Flow rate reduced for VOC samples. 9.5 gal. purged. Sports used on decaport splitter. ERM CN pH was 11, 100 drops NaOH added, pH is 11.5. CR^6 pH is 9.3.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060)
☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021714-111343-0128, 8-021714-145712-0129, 8-021714-111132-0126, 8-021714-110907-0129, 8-021714-111010-0125, 8-021714-110744-0123

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/17/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PWT CN pH was 9, 200 drops added, pH is 11.

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/17/14 **Sample Time:** 11:15

EPA Split Sample ID: LF-03-01-021714-ES01

US Mag Paired Sample ID: LF-03-01-021714 **Sample Interval:** ~10' btoc (5' from btm)

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 453433.57 N 354469.66 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☒ Groundwater

Sampling Method: Peristaltic pump, low-flow purge **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, ½" silicon and PET tubing

Sample Location Description: PRI 2, Landfill, bottom of N face of Landfill between Landfill and Main Ditch

Sample Observations: Sample Odor: ☐ No Odor ☐ Slight Odor ☒ Strong Odor Sample Color: Clear

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°~~F~~C): 14.52 DO (mg/L): 0.00 pH (pH units): 6.89 ORP (mV): -121

Conductivity (µS/cm): 84.5 Turbidity (FNU): 7.6 Total Chlorine (mg/L): 0.00

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes: Well TD is 15.24', screen is 2-12', DTW is 4.45' btoc. Purge flow rate is 1800 mL/min. 8.5 gal. purged. ERM CR^6 pH was 9. ERM CN pH was 11, 100 drops NaOH added, pH is 11.5. Initial CN pH was 6, 200 drops added, pH is 11.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2) ☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☐ pH (EPA 9045D) ☒ TOC (EPA 9060) ☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199) ☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021714-111343-0128, 8-021714-111222-0127, 8-021714-111132-0126, 8-021714-110907-0125, 8-021714-111010-0125, 8-021714-110744-0123

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/17/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

PACIFIC WESTERN TECHNOLOGIES, LTD.

SPLIT SAMPLING FIELD DATA SHEET

US Magnesium NPL Site
Phase 1A Remedial Investigation

Date: 2/13/14 **Sample Time:** 12:30

EPA Split Sample ID: PZ-04-01-021314-ES01

US Mag Paired Sample ID: PZ-04-01-021314 **Sample Interval:** ~12 ft btoc

Split Accepted By: Aaron Baird **Split Accepted From:** Chris Benson

Sample GPS Coordinates: 45 31814.36 N 353519.88 E

Sample Matrix: ☐ Soil ☐ Sed., Exposed ☐ Sed., Saturated ☐ Solid Waste ☐ Surface Water ☐ Wastewater ☒ Groundwater

Sampling Method: Peristaltic pump **Sample Type:** ☒ Grab ☐ Bulk ☐ Composite

Sampling Equipment Used: Peristaltic pump, splitter, ½" silicon & PET tubing, Solinst water level meter, Horiba water qual. meter

Sample Location Description: PRI 9, Smut Area, center of smut piles, N of Plant along main road that runs N/S through smut piles

Sample Observations: Sample Odor: ☒ No Odor ☐ Slight Odor ☐ Strong Odor Sample Color: None

Foreign Material Present: — Other: —

Water Sample: Filtered: ☒ Yes [☒ 0.45µm ☐ 0.2µm] ☐ No Water Clarity: ☒ Clear ☐ Slightly Turbid ☐ Turbid

Temp (°~~F~~ C): 17.98 DO (mg/L): 3.32 pH (pH units): 7.20 ORP (mV): 184

Conductivity (µS/cm) m: 164 10x dilution Turbidity (FNU): 0.0 Total Chlorine (mg/L): 0.06

Soil Sample: Moisture Content: ☐ Dry ☐ Moist ☐ Wet Description: NA

Notes:
Well TD = 17 ft bgs, screen interval = 6.5-16.5 ft bgs, DTW = 8.80 ft btoc, purge flow rate = 1600 mL/min, no drawdown. ERM CN initial pH is 11, 100 drops NaOH added, pH still 11. EPA CN initial pH is 10, 200 drops NaOH added, final pH is 11.

Analyses Requested (see COC): ☒ VOCs (CLP SOM01.2) ☒ SVOCs (CLP SOM01.2) ☒ PAHs-SIM (CLP SOM01.2)
☒ Total Metals (CLP ISM01.3) ☒ Diss. Metals (CLP ISM01.3) ☒ Alkalinity (SM2320B) ☒ pH (EPA 9045D) ☒ TOC (EPA 9060)
☒ Anions (EPA 300.0) ☒ TDS (SM2540C) ☒ Haloacetic Acids (EPA 552.2) ☒ Hexavalent Chromium (EPA 7199)
☒ Perchlorate (EPA 314/6850) ☒ PCBs (CLP CBC01.2) ☒ PCDDs/PCDFs (CLP DLM02.2) ☐ Other:

QC Samples: ☐ MS/MSD: — ☐ Other: —

Chain of Custody Number(s): 8-021314-143444-0089, -172031-0114, -164602-0091, -173145-0095, -173653-0116, -171323-0113

Shipment Via: ☒ FedEx ☒ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature / Date):

Signature: [signature] **Date:** 2/13/14

Split Sampling Field Data Sheet QC Review Completion (Independent QC Reviewer Signature / Date):

Signature: [signature] **Date:** 5.22.14

APPENDIX C
PHOTOGRAPHIC DOCUMENTATION

Phase 1A RI Oversight Photographic Documentation

Photo 1 | PRI Area 8 | 11/25/13
Wastewater flowing over road that runs east/west through PRI area (where containment berm was later constructed)

Photo 2 | PRI Area 8 | 05/08/14
Wastewater accumulation south of new containment berm looking south

Photo 3 | PRI Area 8 | 05/08/14
Wastewater accumulation south of new containment berm looking east

Photo 4 | PRI Area 8 | 05/08/14
Wastewater accumulation south of new containment berm looking west

Phase 1A RI Oversight Photographic Documentation

Photo 5 | PRI Area 8 | 03/24/14
Looking north at 5-strand barbed wire fence constructed around the perimeter of the wastewater impact on BLM land

Photo 6 | PRI Area 8 | 03/24/14
Looking north from berm road at wastewater level in south-central area of PRI after it had receded

Photo 7 | PRI Area 8 | 03/24/14
Looking north from berm road at wastewater level in southeastern area of PRI after it had receded

Photo 8 | PRI Area 8 | 02/11/14
Looking NW at wastewater level in "angel wing" following construction of new containment berm and water recedence

Phase 1A RI Oversight Photographic Documentation

Photo 9 | PRI Area 6 | 03/25/14
Looking N at isthmus road between PRI Areas 6 and 7 following breach repair

Photo 10 | PRI Area 7 | 05/05/14
Presumed main entry point for surface water flow during wastewater breach. Earthwork performed west from here

Photo 11 | PRI Area 7 | 05/06/14
Looking north at surface water accumulation on east side of PRI Area 7 following wastewater breach

Photo 12 | PRI Area 16 | 11/19/13
US Magnesium stack plume settling in the Lakeside Mountains

Phase 1A RI Oversight Photographic Documentation

Photo 13 | PRI Area 4 | 11/25/13
Animal tracks on gypsum pile leading to and from gypsum slurry surface water

Photo 14 | PRI Area 8 | 05/08/14
American Avocets in and around the surface water in the "angel wing"

Photo 15 | PRI Area 5 | 12/11/13
Installing staff gauge SG-5 in the Southeast Ponded Waste Lagoon off the end of a floating dock

Photo 16 | PRI Area 5 | 12/11/13
Staff gauge SG-4 following installation in the Southeast Ponded Waste Lagoon

Phase 1A RI Oversight Photographic Documentation

Photo 17 | ERM Office Trailer | 12/13/13
Collecting first rinse blank from surface soil sampling equipment

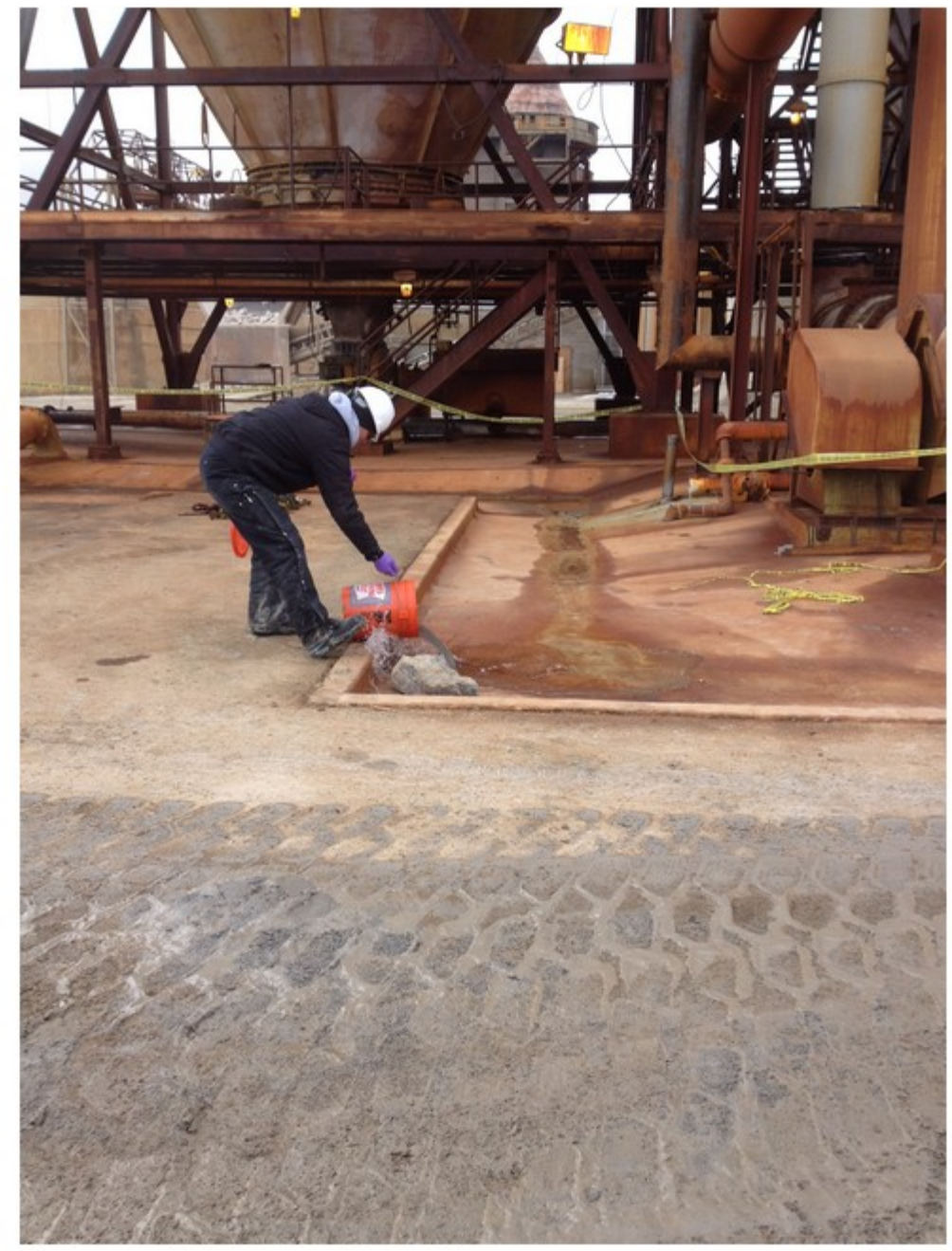


Photo 18 | US Magnesium Plant | 02/06/14
Dumping groundwater sampling purge water into catch basin located beneath the plant powder bins

Photo 19 | PRI Area 1 | 02/06/14
Chlorine gas from the outfall pipe at the confluence of the Chlorine and Main Ditches

Photo 20 | PRI Area 2 | 01/09/14
Smut in auger hole from 0.5 to 6 inches bgs at surface solids sample location PRI2-002

Phase 1A RI Oversight Photographic Documentation

Photo 21 | PRI Area 2 | 05/07/14
Collecting PID readings from soil core prior to sample processing

Photo 22 | PRI Area 2 | 05/07/14
Placing solids (smut) from the 24 to 26 feet bgs core sample interval from boring location PRI2-006 into sieve

Photo 23 | PRI Area 2 | 05/07/14
Soil core from boring location PRI2-006 which shows the native soil interface encountered at approx. 31 feet bgs

Photo 24 | PRI Area 2/5 | 03/05/14
Rust colored area in PRI Area 5 that appears to be a former waste disposal area

Phase 1A RI Oversight Photographic Documentation

Photo 25 | PRI Area 3 | 11/21/13
ERM searching for the presence of surface water in the sanitary lagoon; no standing water was observed

Photo 26 | PRI Area 4 | 11/25/13
Surface water from gypsum slurry flowing out onto the gypsum pile towards the Northwest Ponded Waste Lagoon

Photo 27 | PRI Area 4 | 11/25/13
Collecting surface water sample PRI4-013 from the gypsum slurry outfall with a pole-mounted dipper

Photo 28 | PRI Area 4 | 11/25/13
Using dipper to directly fill VOA vials for the VOCs fraction of surface water sample PRI4-13-SW01-112513-ES01

Phase 1A RI Oversight Photographic Documentation

Photo 29 | PRI Area 4/9 | 11/26/13
Southwest corner of gypsum pile where gypsum flows into the smut piles; there is no boundary between the two areas

Photo 30 | PRI Area 7 | 11/22/13
Flowing seep at surface water sample location PRI7-014

Photo 31 | PRI Area 7 | 11/22/13
Flowing seep at surface water sample location PRI7-013

Photo 32 | PRI Area 7 | 11/21/13
Peristaltic pump tubing in flowing seep for collection of surface water sample at location PRI7-007

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Photo 33 | PRI Area 7 | 11/22/13
Using Horiba multi-parameter meter to measure water quality parameters for surface water sample PRI7-013

Photo 34 | PRI Area 8 | 02/12/14
Iron, rust colored, modeling observed at or just under the surface around the perimeter of wastewater impact

Photo 35 | PRI Area 8 | 12/18/13
Iron precipitation at leading edge of wastewater flow, where wastewater is crossing over the dirt road

Photo 36 | PRI Area 8 | 05/07/14
Stake for surface solids sample location PRI8-005A in foreground and stake for location PRI8-005 in background

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Photo 37 | PRI Area 8 | 12/16/13
Subsurface soil sample core from sample location PRI8-017. 0 to 5 feet bgs core above and 5 to 10 feet bgs core below.

Photo 38 | PRI Area 8 | 12/16/13
Driving En Core Sampler into clay at approx. 8 feet bgs in first subsurface soil sample core from boring location PRI8-017

Photo 39 | PRI Area 8 | 02/12/14
Collecting surface water sample at location PRI8-018 from ponded wastewater on the north side of the berm road

Photo 40 | PRI Area 8 | 02/12/14
Collecting surface water sample at location PRI8-019 from ponded wastewater on BLM property

Phase 1A RI Oversight Photographic Documentation

Photo 41 | PRI Area 8 | 03/25/14
"angel wing" access road that was undermined from wastewater erosion and caved in while driving on it

Photo 42 | PRI Area 9 | 01/06/14
Surface solid waste sample location PRI9-002 which shows example of auger pattern when >5 aliquots are required

Photo 43 | PRI Area 9 | 01/07/14
Surface solids sample location PRI9-007 west of smut pile in native soil area (location PRI9-012 was in similar area)

Photo 44 | PRI Area 9 | 01/06/14
Example of different types of smut at one sample location

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Photo 45 | PRI Area 9 | 01/06/14
Area around surface solid waste sample location PRI9-002

Photo 46 | PRI Area 10 | 05/05/14
Sonic drill rig advancing borehole at subsurface solids sample location PRI10-008

Photo 47 | PRI Area 10 | 05/05/14
Releasing PRI10-008 soil core into plastic bag sleeves in 2- to 3-foot sections

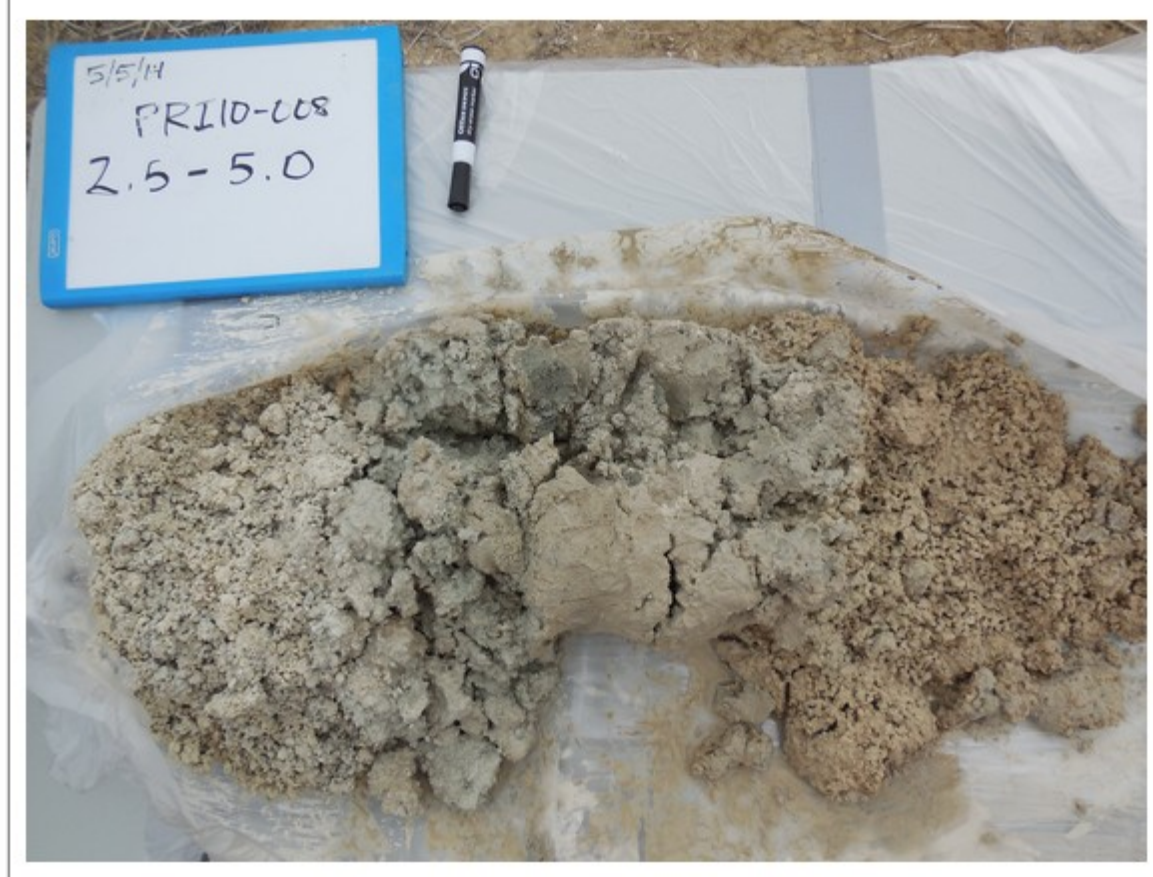

Photo 48 | PRI Area 10 | 05/05/14
Core sample from the 2.5- to 5-foot interval from boring PRI10-008

Phase 1A RI Oversight Photographic Documentation

Photo 49 | PRI Area 10 | 05/05/14
Core sample from the 5- to 7.5-foot interval from boring PRI10-008

Photo 50 | PRI Area 10 | 05/05/14
Core sample from the 7.5- to 10-foot interval from boring PRI10-008 which shows the native soil interface

Photo 51 | PRI Area 11 | 05/06/14
Surface solids sample collection at location PRI11-003 in steel framing storage area on south side of US Magnesium plant

Photo 52 | PRI Area 11 | 05/06/14
Sample location PRI11-011 following collection of sample aliquots from 0- to 2-inches with flat bottom scoop

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Photo 53 | PRI Area 11 | 05/06/14
Five sample aliquots collected with a flat bottom scoop from a 4- by 6-inch area, 2 inches deep at location PRI11-011

Photo 54 | PRI Area 12 | 12/10/13
Surface solids sample location PRI12-002 in disturbed native soil area south of Hill Brothers

Photo 55 | PRI Area 12 | 12/10/13
Surface solids sample location PRI12-010 in salt pile area southeast of the Star Pond

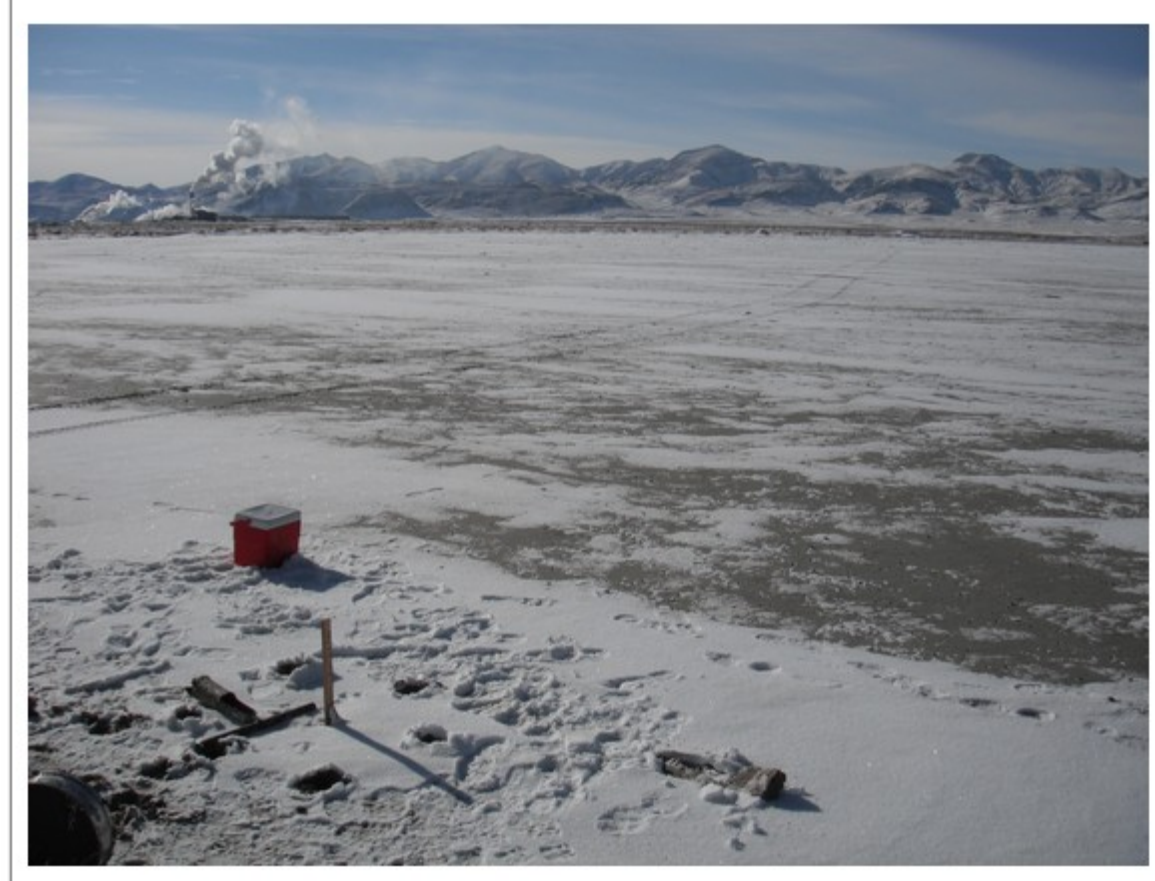

Photo 56 | PRI Area 13 | 12/06/13
Surface solids sample location PRI13-003 in mud-flat area on the north side of PRI Area 13

Phase 1A RI Oversight Photographic Documentation

Photo 57 | PRI Area 13 | 12/06/13
Surface solids sample location PRI13-002 in sparsely vegetated area on the east side of PRI Area 13

Photo 58 | PRI Area 14 | 12/03/13
Collocated surface solids and water sample location PRI14-006 in a saturated salt crusted area

Photo 59 | PRI Area 14 | 11/19/13
Observing surface water sample collection at location PRI14-008 from the nearest shoreline

Photo 60 | PRI Area 14 | 11/19/13
Original PRI14-013 sample location which was moved north to deeper water body

Phase 1A RI Oversight Photographic Documentation

Photo 61 | PRI Area 14 | 11/19/13
Collecting surface water sample with peristaltic pump at the revised PRI14-013 location

Photo 62 | PRI Area 14 | 11/21/13
Area around sample location PRI14-005; graded soil area in foreground and saturated salt flat area in background

Photo 63 | PRI Area 14 | 02/11/14
Collocated surface solids, subsurface solids, and surface water sample location PRI14-005

Photo 64 | PRI Area 14 | 12/16/13
Collecting subsurface solids sample with direct-push rig at location PRI14-005, east of surface sample location

Phase 1A RI Oversight Photographic Documentation

Photo 65 | PRI Area 14 | 12/16/13
Subsurface soil sample core from sample location PRI14-005. 0 to 4 feet bgs core below and 4 to 6 feet bgs core above.

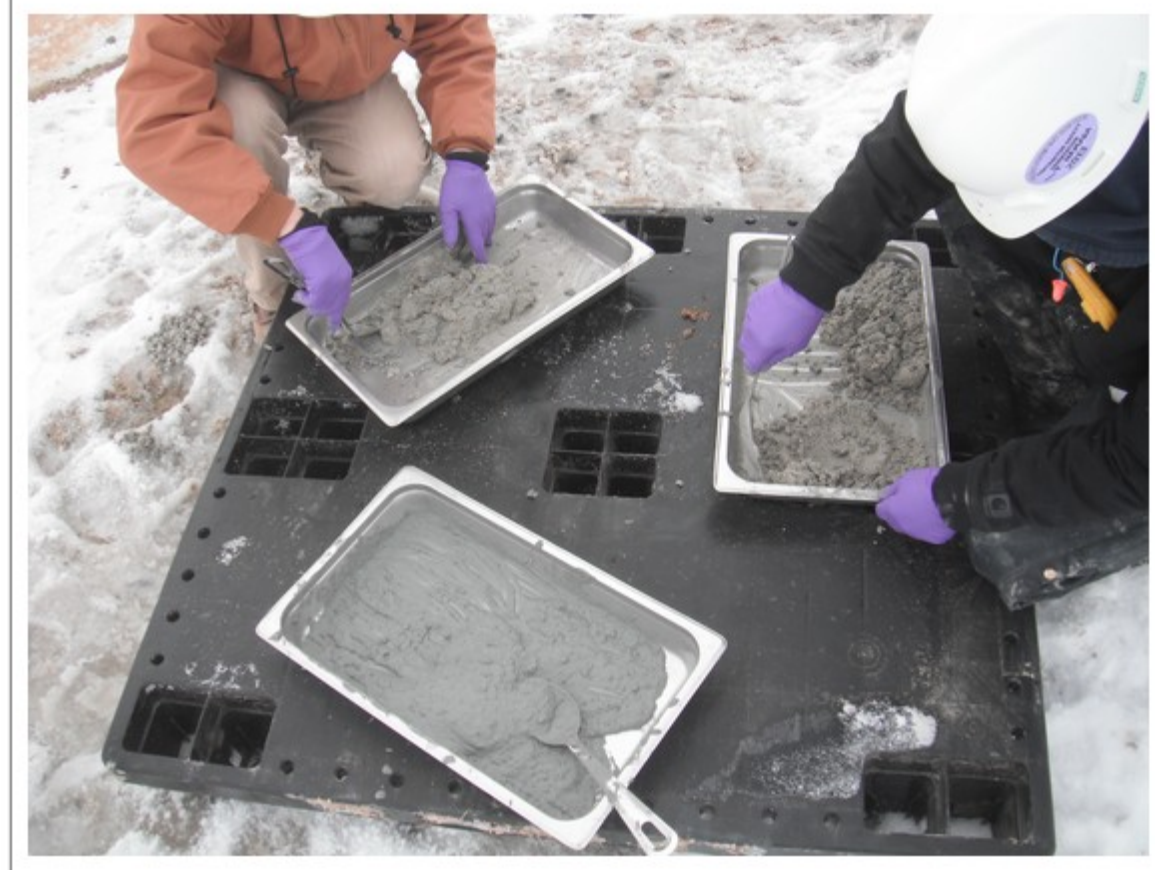

Photo 66 | PRI Area 14 | 12/16/13
Homogenizing the three sample intervals for PRI14-005 subsurface solids samples

Photo 67 | PRI Area 14 | 11/21/13
Slow flowing seep to the north-northwest of sample location PRI14-005

Photo 68 | PRI Area 15 | 11/24/13
Surface solids sample location PRI15-002 in flat vegetated area north-northwest of the US Magnesium plant

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Photo 69 | PRI Area 15 | 11/24/13
Surface solids sample location PRI15-010 in mounded soil at the edge of flat area to the south of the US Magnesium plant

Photo 70 | PRI Area 15 | 11/24/13
Five sample aliquots collected with a flat bottom scoop from a 4- by 4-inch area, 2 inches deep at location PRI15-010

Photo 71 | PRI Area 16 | 11/20/13
Surface solids sample location PRI16-004 on a steep face on the eastern slope of the Lakeside Mountains

Photo 72 | PRI Area 16 | 11/20/13
Surface solids sample location PRI16-008 approximately 50 feet up the initial mountain slope from the valley floor

Phase 1A RI Oversight Photographic Documentation

Photo 73 | PRI Area 16 | 11/20/13
Scoop aliquot for surface solids sample PRI16-008 in sieve

Photo 74 | PRI Area 16 | 11/20/13
Sample volume that did not pass through the sieve from one aliquot for surface solids sample PRI16-008

Photo 75 | PRI Area 17 | 01/13/14
12-inch long pre-pack well screen used for monitoring well MW-16

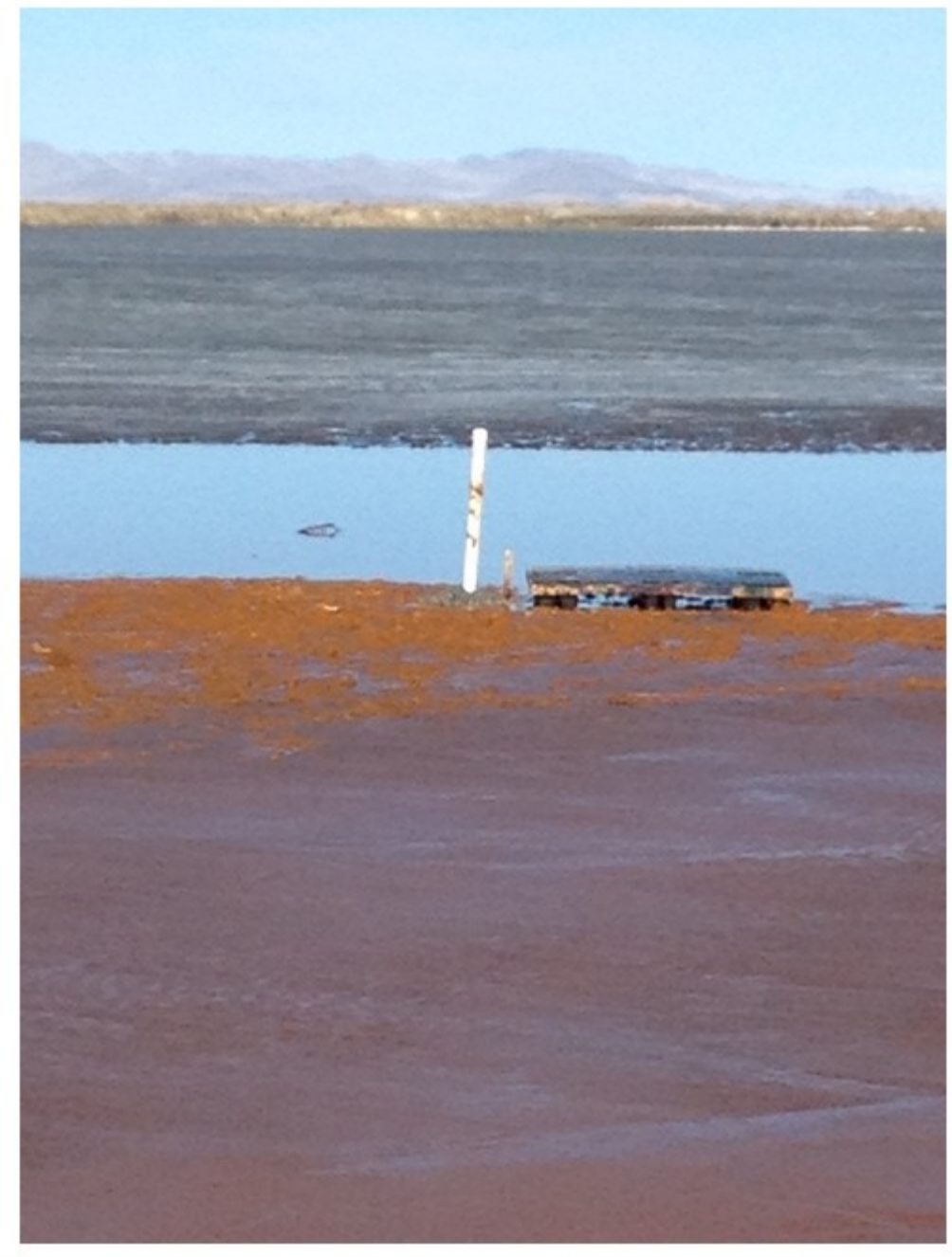

Photo 76 | PRI Area 4 | 01/13/14
Monitoring well MW-16 following installation in gypsum pile at the shoreline of the Northwest Ponded Waste Lagoon

Phase 1A RI Oversight Photographic Documentation

Photo 77 | PRI Area 5 | 12/09/13
Clay in bottom auguer flights from borehole MW-19B

Photo 78 | PRI Area 5 | 02/14/14
Wastewater from the western edge of the Southeast Ponded Waste Lagoon around well MW-19A/B during sampling

Photo 79 | PRI Area 12 | 12/06/13
Installing pre-pack well screen for well MW-20B

Photo 80 | PRI Area 6 | 12/10/13
Well development at well MW-14

Phase 1A RI Oversight Photographic Documentation

Photo 81 | PRI Area 9 | 02/13/14
Collecting groundwater sample through sample splitter at well MW-18