Beneficiary/Public Review Draft

Addendum to Former ASARCO East Helena Facility Interim Measures Work Plan—2015 and 2016

Prepared for

The Montana Environmental Trust Group, LLC

Trustee of the Montana Environmental Custodial Trust

January 2016

ch2m

7 West 6th Avenue Suite 519
Helena, Montana 59601

EN1120151049PDX

Contents

Section **Page**

Tables

Figures (located at the end of their respective sections)

Acronyms and Abbreviations

AP	Acid Plant
bgs	below ground surface
CMS	Corrective Measures Study
CSM	conceptual site model
Custodial Trust	Montana Environmental Custodial Trust
ET	evapotranspiration
HDS	high-density sludge
IM	interim measure
IM Work Plan 2012	Interim Measures Work Plan 2012
IM Work Plan 2015/2016	Interim Measures Work Plan 2015 and 2016
MDEQ	Montana Department of Environmental Quality
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
MPDES	Montana Pollutant Discharge Elimination System
PPC	Prickly Pear Creek
PPE	personal protective equipment
QA/QC	quality assurance and quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAI	Source Area Investigation
SPHC	South Plant Hydraulic Control
SWPPP	Stormwater Pollution Prevention Plan
TPA	Tito Park Area
U.S.	United States
USEPA	U.S. Environmental Protection Agency
WTP	water treatment plant

SECTION 1

Introduction

The purpose of this *Addendum to Former ASARCO East Helena Facility Interim Measures Work Plan—2015 and 2016* (hereafter referred to as Addendum) is to support U.S. Environmental Protection Agency (USEPA) approval of the removal of source materials from the site of the former sulfuric acid plant (former Acid Plant Area). This Addendum describes the work proposed for implementation as an interim measure (IM) in 2016 at the former ASARCO Smelter (former Smelter site) in East Helena, Montana.

On May 29, 2015, the *Former ASARCO East Helena Facility Interim Measures Work Plan—2015 and 2016* (IM Work Plan 2015/2016) (CH2M HILL, 2015a) was finalized per USEPA approval received on May 1, 2015. The IM Work Plan 2015/2016 describes the Prickly Pear Creek (PPC) Realignment, which is part of the South Plant Hydraulic Control (SPHC) IM, and the Evapotranspiration (ET) Cover System IM, but does not describe removal of contaminated soils at the former Acid Plant Area as a Source Removal IM. The Corrective Measures Study (CMS) evaluations that identified the potential benefits of the Acid Plant soil removal had not been completed at the time the IM Work Plan 2015/2016 was approved.

This Addendum is intended to describe the Acid Plant Source Removal IM (referenced herein as the AP Source Removal IM) only, and therefore does not reiterate the information provided in the IM Work Plan 2015/2016. The Addendum summarizes the relevant data collected during the ongoing CMS source area investigations (SAIs), source control evaluations, and associated modeling. The collected data identify the potential benefits of removing saturated soils with elevated concentrations of arsenic that pose an ongoing source of contamination to groundwater from the former Acid Plant (i.e., the proposed AP Source Removal IM). This Addendum also presents preliminary design information to support USEPA approval of the proposed IM. The IM activities presented herein are submitted for USEPA review and approval as Lead Agency, and for Beneficiary and public review and comment.

The Montana Environmental Trust Group, LLC, Trustee of the Montana Environmental Custodial Trust (Custodial Trust), is submitting this Addendum in compliance with Paragraph 14 of the First Modification to the 1998 Resource Conservation and Recovery Act (RCRA) Consent Decree (First Modification, 2012) for the former Smelter site.

1.1 Proposed Activities

The AP Source Removal IM is planned for implementation in 2016, prior to placement of the ET Cover System (**Figure 1-1**). The ET Cover System IM, described in the IM Work Plan 2015/2016 (CH2M HILL, 2015a), was designed to allow the flexibility to implement potential source control actions, including the AP Source Removal IM proposed in this Addendum. The schedule for implementation of the AP Source Removal IM was developed to ensure that the ET Cover System will not be disturbed once completed.

The proposed AP Source Removal IM consists of the following activities:

- Demolish and remove process equipment, building floors, foundations, footings, and any other underground structures within the excavation footprint.
- Excavate approximately 14,000 cubic yards of soil to the depth of the ash-clay layer (approximately 35 feet below ground surface) and place it within the central corridor of the ET Cover System (**Figure 1-1**), where it will be protectively managed within the USEPA-approved Area of Contamination.
- Dewater groundwater from within the excavation limits for excavation of the saturated soils below the encountered groundwater elevation. Treat collected groundwater in the high-density sludge (HDS) water treatment plant (HDS WTP) prior to discharge to Lower Lake.

- Backfill the excavation with clean borrow soil below groundwater levels, and replace the excavation spoils above the groundwater table.

These activities are described further in subsequent sections of this Addendum.

1.2 Summary of Relevant Corrective Measures Study Activities

CMS evaluations of source control actions (consisting of removal, containment, and treatment) are being conducted for the primary source areas at the former Smelter site, which are the West Selenium Area, North Plant Arsenic Area, Speiss-Dross Area, Slag Pile, and former Acid Plant Area (**Figure 1-2**). The purpose of the CMS evaluations is to identify and assess alternatives for meeting the Corrective Action Objectives outlined in the approved *Former ASARCO East Helena Facility Corrective Measures Study Work Plan* (CMS Work Plan) (CH2M HILL, 2015b), which include protection of human health and the environment, and to prevent or mitigate potential contaminant migration in groundwater and restore impacted media to the extent practicable. The following sections summarize the CMS evaluations conducted since the IM Work Plan 2015/2016 was drafted, with relevance to the AP Source Removal IM. The CMS evaluations will be documented more fully in the upcoming CMS Report.

1.2.1 Source Control Measure/Groundwater Corrective Measures

Evaluations are being conducted to assess the potential effects of select source control corrective measures at the former Smelter site source areas. The potential source control measures (removal, containment via slurry wall, construction of a permeable reactive barrier, and selective pumping and treatment) were screened for their ability to meet remedy performance standards as described in the USEPA-approved CMS Work Plan. These evaluations are ongoing as additional data are collected from the SAIs. Potential source control measures are evaluated for their effectiveness, implementability, and cost.

1.2.2 Source Area Investigations (SAIs)

Additional field data were collected in 2014 and 2015 to further characterize soils and groundwater within areas of the former Smelter site believed to be the primary source areas. The data were used to support the corrective measures evaluations and associated groundwater modeling. The objectives of the 2014 and 2015 SAIs were to further delineate soil and groundwater quality in the West Selenium Area, North Plant Arsenic Area, former Acid Plant Area, and Speiss-Dross Area, to refine the groundwater flow and contaminant fate and transport model, and to develop the preliminary designs of potential corrective measures. The 2015 SAI work plan (Hydrometrics, 2015b) describes additional data needed to support further modeling and evaluation of potential corrective measures within the West Selenium Area, North Plant Arsenic Area, former Acid Plant Area, and Speiss-Dross Area.

The 2015 SAI included the installation of four additional soil borings at the former Acid Plant Area in June and July 2015, of which two were completed as new monitoring wells. Soil and groundwater sampling was performed for metals analyses, geotechnical soil properties, and leach testing. In addition to soil and groundwater testing, the 2015 SAI included a hydraulic evaluation of the effectiveness of the existing Speiss-Dross slurry wall. The results of these investigations were used to further delineate source areas and update the conceptual site model (CSM) summarized in Section 3.

1.2.3 Predictive Modeling

Refinement of the groundwater and source area assumptions is incorporated into predictive groundwater flow and fate and transport modeling of baseline conditions and selected corrective measures. The model runs have been used in CMS evaluations to estimate reductions in contaminant mass and changes in plume extents that are used to refine the CSM with respect to fate and transport of contamination (summarized in Section 3). Model calibrations are ongoing to incorporate updated groundwater monitoring data and data from SAI field investigations. CMS evaluations include predictive modeling of arsenic and selenium in groundwater under existing approved IMs, and predictive modeling of arsenic and selenium in groundwater

using the select corrective measures assumptions (such as mass removal or groundwater containment) in addition to the approved IMs.

As a result of the investigations and evaluations, removal of the former Acid Plant Area soils (AP Source Removal IM) is proposed at this time.

1.3 Work Plan Summary

The Custodial Trust is submitting this Addendum in compliance with Paragraph 14 of the First Modification. The evaluation and subsequent recommendation of the AP Source Removal IM incorporates information presented in previous remedial investigations, IM Work Plans, and additional reports and technical memorandums prepared by the Custodial Trust. General background information on site history and conditions is presented in the *Phase II RCRA Facility Investigation—East Helena Facility* (Phase II RFI; GSI Water Solutions, Inc., 2014). Other relevant background documents are located on the Custodial Trust Web site: http://www.mtenvironmentaltrust.org/.

Organization of the Addendum reflects the format of the IM Work Plan 2015/2016 (CH2M HILL, 2015a), and provides only the additional information necessary to support approval of the AP Source Removal IM. This Addendum presents information as follows:

- **Section 1: Introduction**.
- **Section 2: Overview of Proposed Source Removal Interim Measures Implementation** provides a summary-level description of the AP Source Removal IM proposed for implementation in 2016.
- **Section 3: Updated Conceptual Site Model** updates the existing CSM described in the IM Work Plan 2015/2016 with water level and groundwater arsenic and selenium data collected in 2015.
- **Section 4: Data Sufficiency** summarizes the existing data used in the development of the work proposed to implement the AP Source Removal IM.
- **Section 5: Engineering Design and Construction Information for Proposed Source Removal** provides conceptual design information and outlines construction and implementation requirements to complete the IM in coordination with ongoing IM construction.
- **Section 6: Remediation Waste Management** describes how hazardous and nonhazardous remediation waste will be managed during implementation of the IM.
- **Section 7: Status of Permitting Activities and Approvals** provides an update on permitting and licensing requirements necessary to complete the IM.
- **Section 8: Project Management and Schedule** provides an overview of project management activities and the proposed schedule for IM implementation. Updates to the organizational structure, lines of communication, public participation, documentation and reporting, and the schedule are described in this section.
- **Section 9: References** contains a bibliography of documents cited within the text.

Appendix A contains slides summarizing the former Acid Plant Area 2015 SAI results. **Appendix B** contains public comments received on the Addendum IM Work Plan 2015/2016, with USEPA responses and a conditional letter of approval.

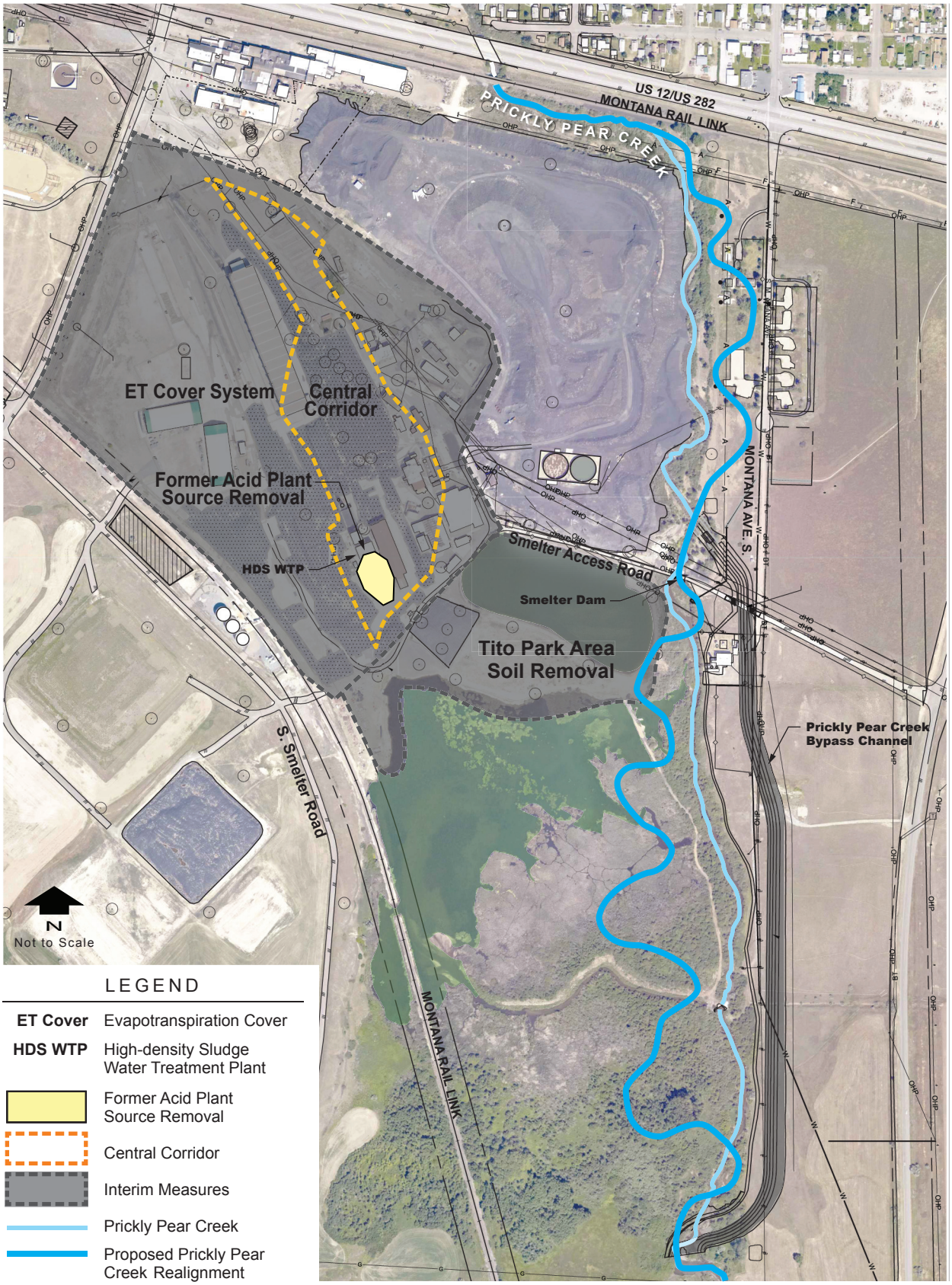
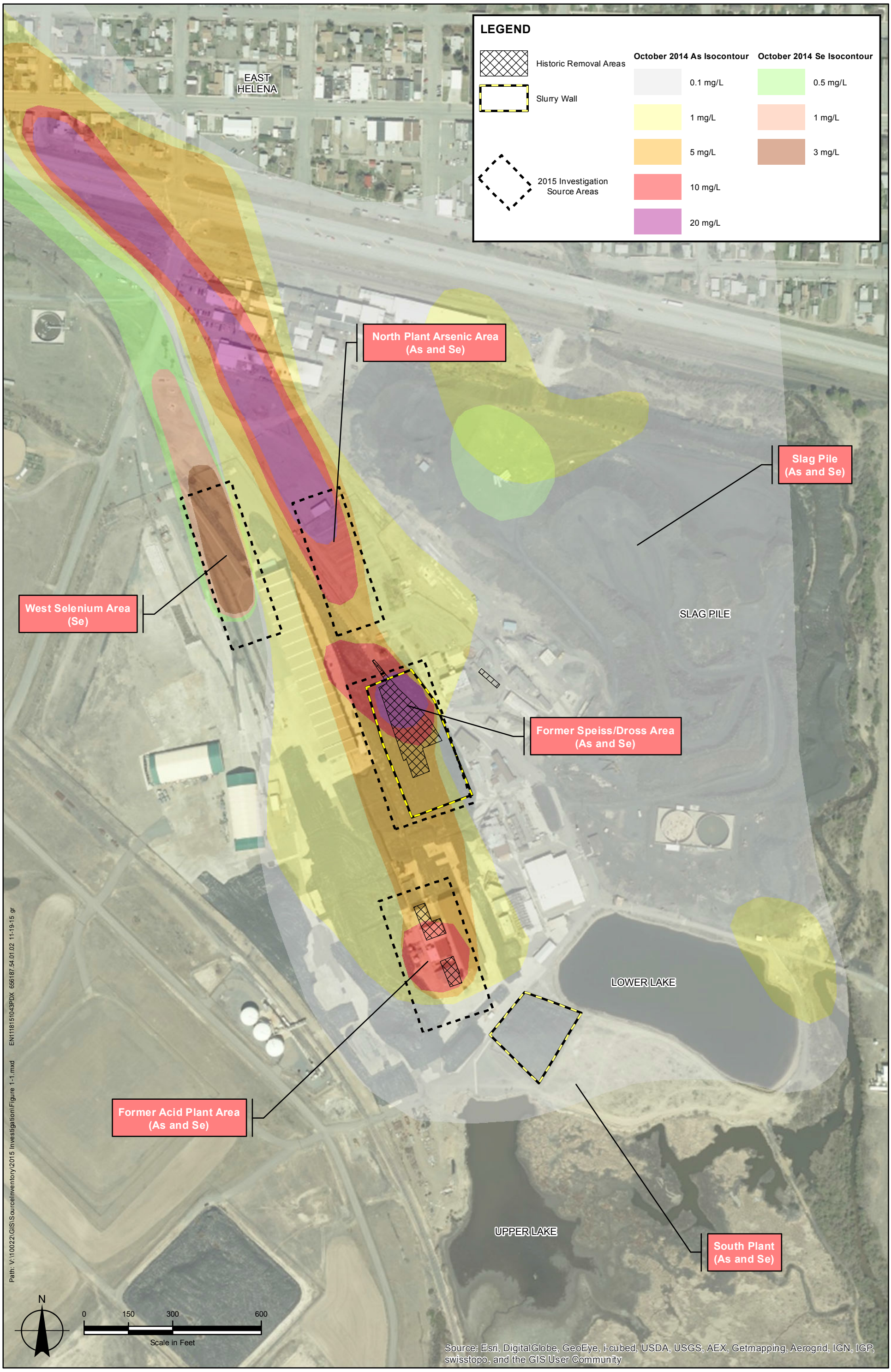


FIGURE 1-1
Interim Measures Components
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana



Notes:
As = arsenic
Se = selenium
mg/L = milligrams per liter

Hydrometrics, Inc
Consulting Scientists and Engineers

This figure was prepared by Hydrometrics, Inc. in 2015.

Figure 1-2
Potential Groundwater Contaminant Source Areas
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

ch2m

SECTION 2

Overview of Proposed Acid Plant Source Removal Interim Measures Implementation

This section provides an overview of the AP Source Removal IM activities proposed for implementation in 2016. Engineering details for the work summarized in this section are provided in Section 5.

2.1 Objectives

The objectives of the AP Source Removal IM are as follows:

- Contribute to meeting the corrective action objectives identified in the USEPA-approved CMS Work Plan.
- Reduce the mass loading of contaminants to groundwater.
- Improve local groundwater quality.
- Integrate AP Source Removal IM with the ongoing IM construction.
- Utilize the HDS Plant to treat dewatering water.

2.2 Description

The AP Source Removal IM will remove relatively accessible, highly contaminated source materials located within the saturated zone of groundwater, and place them well above the water table and under the ET Cover System IM. The area proposed for excavation includes the former Acid Plant process water settling facility (now the location of the Sludge Recovery Building, HERO Building, Lime Silo, and Equipment Wash Facility). The former settling facility consisted primarily of an epoxy-coated concrete tank (settling pond, also called settling tank), measuring approximately 68 feet by 35 feet by 9 feet deep, as well as neutralization dumpsters and a temporary sediment drying area (**Figure 2-1**).

Previous remediation activities in the area included removal of contaminated soils to a depth of approximately 20 feet below ground surface, at the estimated elevation of the water table. Because the original remediation stopped prior to contacting the low permeability ash-clay layer, located approximately 15 feet below groundwater, contaminated soils remain below the water table, even though the water table has been lowered as a result of the SPHC IM work to date. These soils continue to leach contaminants to groundwater.

2.3 Technical Evaluations

The final design of the AP Source Removal IM was informed by the following technical evaluations:

- 2015 SAI
    - Defined the lateral and vertical source material boundaries and contaminant concentrations
    - Determined leachability of metals from saturated and unsaturated soils in the former Acid Plant Area
    - Established geotechnical properties of the unconsolidated soils
    - Determined depth and characteristics of the basal ash/clay unit
- Groundwater flow and fate and transport modeling of IMs and their influence on contaminant concentrations in groundwater and plume extents

- An estimated materials balance analysis based on the volume of soil to be excavated from the former Acid Plant Area, in order to coordinate with construction grades needed for the final ET Cover System

These technical evaluations were used to update the CSM as presented in Section 3, and evaluate selected corrective measures at the former Smelter site.

Design engineering was completed to an approximate 30 percent design level for supporting decision-making and that design is presented in this Addendum. Final construction drawings, specifications, and contract documents will be completed in January 2016.

Notes:
1. APSD - Acid Plant Sediment Drying Bed
2. AOC - Area of Contamination
3. IM - Interim Measure

0 45 90
Scale in Feet

N

FIGURE 2-1
Former Acid Plant Area Site Features
Addendum Interim Measures Work Plan - 2015/2016
East Helena, Montana

SECTION 3

Updated Conceptual Site Model

The CSM integrates current information on site conditions into a comprehensive understanding of the nature, extent, fate and transport of contaminants from and around the former Smelter Site. It is a living document that is updated as additional data are collected through ongoing performance monitoring and CMS evaluations. This section provides updates to groundwater conditions and to the CSM presented in the IM Work Plan 2015/2016 from ongoing evaluations.

3.1 Groundwater Levels

Since publication of the IM Work Plan 2015/2016, groundwater and surface water level monitoring has continued on and around the former Smelter site. Water levels have been recorded monthly throughout the project area, and more frequently (approximately biweekly) on a subset of monitoring locations within the former Upper Lake Marsh Area and former Smelter site where ongoing IM construction activities are focused and the IMs are expected to have the greatest effect. Following is an update of water level conditions and trends within these two areas.

3.1.1 Upper Lake Marsh Area Groundwater Levels

Since 2011, 13 piezometers have been completed within the former Upper Lake Marsh Area for monitoring groundwater responses to the IMs. Nine of the piezometers were included in the focused (biweekly) water level monitoring program (**Figure 3-1**). As a result of PPC Realignment construction, all but two of the piezometers have been removed in 2015, with groundwater level monitoring continuing as long as site access and piezometer availability is permitted. **Table 3-1** lists the status of each piezometer and the updated water level trends.

Groundwater levels in the former Upper Lake Marsh Area have continued to decline throughout 2015 in response to the former Upper Lake Marsh Area construction dewatering activities as well as the generally dry conditions experienced in 2015. Since initiation of the SPHC IM in late 2011, water levels within the former Upper Lake Marsh Area have declined almost 10 feet in the eastern portion closest to PPC (PPCRPZ-2) and just over 2.5 feet in the western area as characterized by ULMPZ-1 (**Table 3-1**). Water level hydrographs representing data through December 16, 2015, are provided in **Figure 3-2**.

TABLE 3-1
Upper Lake Marsh Area Groundwater-Level Response to Completed Interim Measures
Addendum to Interim Measures Work Plan 2015/2016

Site	Piezometer Status	Upper Lake Dewatering 10/31/11-10/22/13	Prickly Pear Creek Diversion 10/22/13-12/13/13	Lower Lake/TPA Dewatering 5/1/14-10/14/14	Total Water Level Decline 10/31/11 – 12/16/15
PPCRPZ-01	Abandoned 6/15	4.46	2.52	1.41	8.43*
PPCRPZ-02	Active	3.98	1.79	1.60	9.62
PPCRPZ-03	Abandoned 7/15	4.00	1.37	1.17	7.72*
PPCRPZ-04	Abandoned 4/15	3.52	1.02	1.42	NA
PPCRPZ-05	Abandoned 7/15	0.46	0.84	2.19	4.16*
PPCRPZ-06	Abandoned 6/15	-1.40	0.64	1.97	NA
PPCRPZ-07	Abandoned 6/15	-2.32	1.30	1.66	NA
ULMPZ-1	Active	1.16	-0.07	0.73	2.36

TABLE 3-1
Upper Lake Marsh Area Groundwater-Level Response to Completed Interim Measures
Addendum to Interim Measures Work Plan 2015/2016

Site	Piezometer Status	Upper Lake Dewatering 10/31/11-10/22/13	Prickly Pear Creek Diversion 10/22/13-12/13/13	Lower Lake/TPA Dewatering 5/1/14-10/14/14	Total Water Level Decline 10/31/11 – 12/16/15
ULMPZ-2	Abandoned 6/15	1.19	0.45	1.71	NA

Notes:
* = as measured prior to the abandonment date
Total water level declines based on Upper Lake stage of 3,920.46 feet on October 20, 2011.
Monitoring locations are shown in **Figure 3-1**.
Negative values indicate water level rise.
NA = not available; insufficient data
TPA = Tito Park Area

3.1.2 Plant Site Groundwater Levels

Similar to the former Upper Lake Marsh Area, groundwater level monitoring on the plant site has focused on areas expected to be most influenced by the SPHC, TPA Source Removal, and ET Cover System IMs. Ten plant site monitoring wells are included in the program, as shown in **Figure 3-1**. Water level trends to date for the three IM periods, as well as for the entire 2011 to 2015 IM period, are listed in **Table 3-2** and shown in **Figure 3-3**.

Groundwater levels across the plant site have been influenced in multiple ways by the 2015 construction activities. Water levels have shown the largest decline in the North Plant Arsenic Area in 2015, with wells DH-17, DH-66, and DH-51 declining about 2 feet from November 2014 to November 2015 (well DH-49 went dry as of March 2015). The majority of this decline occurred between November 2014 and March 2015, indicating that the 2015 decline is largely due to the 2014 TPA Source Removal/Lower Lake Dewatering IM as opposed to the 2015 PPC Realignment construction dewatering. In the area of the South Plant, water levels have risen since August 2015 in response to the diversion of PPC Realignment construction dewatering water to Lower Lake. Absent this source of recharge, South Plant water levels would be about 2 feet lower than those shown in **Table 3-2**, for an overall water level decline of up to about 9 feet.

Groundwater levels in the former Acid Plant Area, where the 2016 contaminant source removal action is planned, have declined by more than 5 feet between October 2011 and December 2015 based on data from monitoring wells DH-19R, DH-42, and DH-71 (**Figure 3-1**, **Table 3-2**). The greatest water level declines, about half of the total decline, occurred during the initial Upper Lake dewatering phase of the SPHC IM. This result was expected because the former Acid Plant Area is located above a former channel of PPC extending from beneath the former Upper Lake area along the west side of the plant site, providing a direct hydrologic connection between the former Acid Plant Area groundwater and the former Upper Lake. The approximately 5-foot water level declines in the former Acid Plant Area equate to an increase in depths to groundwater below ground surface from about 15 feet pre-SPHC to currently about 20 feet.

The reduction in groundwater levels has desaturated some of the most highly contaminated soils in the former Acid Plant Area, although the 2015 SAI results show elevated concentrations of arsenic and other contaminants (i.e., cadmium and selenium) in the vicinity of the former Acid Plant settling pond persist to depths as great as 30 feet where the low-permeability ash/clay layer occurs. Although groundwater levels in the area are expected to decline an additional 2 to 3 feet following the PPC Realignment, contaminated soils are expected to remain below the water table post-SPHC.

Stable groundwater arsenic concentrations of 10 to 15 mg/L at monitoring well DH-19R indicate that soils in this area continue to leach arsenic (and cadmium) to groundwater. Although selenium concentrations in the former Acid Plant Area groundwater are low (typically less than 0.01 mg/L), total soil selenium

concentrations up to 60 mg/kg in this area and leach test results up to 3.8 mg/L suggest that the former Acid Plant Area soils could leach significant selenium to groundwater if groundwater geochemical conditions change in the future. As a result of the ongoing arsenic and cadmium loading to groundwater, and the potential for future selenium loading to groundwater, soils within the former Acid Plant settling pond area are slated for removal in 2016.

TABLE 3-2
Plant Site Groundwater-Level Response to Completed Interim Measures
Addendum to Interim Measures Work Plan 2015/2016

Site	South Plant Hydraulic Control Interim Measure Component			Total Water Level Decline 10/31/11 – 12/16/15
	Upper Lake Dewatering 10/20/11-10/15/13	Prickly Pear Creek Diversion 10/15/13-12/13/13	Lower Lake/TPA Dewatering 5/1/14-10/14/14	
South Plant				
Lower Lake	2.56	1.64	3.61	6.87
APSD-8	0.52	3.55	0.48	6.66
APSD-9	4.17	2.01	Abandoned 7/14	9.92
APSD-12	2.90	1.66	Abandoned 7/14	8.01
DH-20	2.73	0.88	1.95	4.31
Average	**2.58**	**1.95**	**2.01**	**7.15**
Acid Plant Area				
DH-19R	2.40	0.91	1.13	4.64
DH-42	2.54	0.92	0.92	5.31
DH-71	2.92	0.92	0.836	5.85
Average	**2.62**	**0.92**	**0.73**	**5.27**
Northwest Plant Site				
DH-17	4.91	1.21	-0.70	8.69
DH-66	5.36	1.24	-0.77	9.18
DH-51	4.78	1.25	-0.68	7.98
DH-49	5.32	1.28	-0.85	>6.41*
Average	**5.09**	**1.24**	**-0.75**	**>8.07**

Notes:
*DH-49 dry as of March 2015.
Monitoring locations shown in Figure 3-1.
TPA = Tito Park Area

3.2 Nature and Extent of Arsenic and Selenium

As noted in previous IM Work Plans, and in the CMS Work Plan, groundwater quality evaluations have focused primarily on arsenic and selenium because monitoring to date has shown that other site-related constituents of concern are co-located with these two chemicals. Data have consistently shown two relatively distinct, narrow groundwater contaminant plumes, one with elevated arsenic concentrations and the other with elevated selenium concentrations, originating from the former Smelter site and extending

north-northwest along the general direction of groundwater flow. An additional lower concentration arsenic plume is present north of the Slag Pile. The overall occurrence and distribution of these contaminants in groundwater were generally described in the IM Work Plan 2015/2016 (CH2M HILL, 2015a) and are therefore not reiterated in this Addendum. Rather, updates based on the latest comprehensive monitoring data from October 2015 and the 2015 SAI of the former Acid Plant are summarized below.

3.2.1 Arsenic and Selenium in Groundwater

The configuration of the arsenic groundwater plume based on October 2015 data is shown in **Figure 3-4**. Although higher concentration wells in the center of the arsenic plume have shown varying trends, the overall extent of the plume, as defined by the 0.010 mg/L arsenic concentration contour (which is the MCL for arsenic), has not expanded appreciably since the plant ceased operations in 2001. Recently, the greater-than-10 mg/L arsenic plume boundary has contracted in some areas, and now consists of more isolated areas within the former Smelter site, and an area extending into East Helena. In particular, decreases in arsenic have been observed at some wells in the former Acid Plant Area, which is located immediately downgradient of the TPA removal area and where the SPHC IM has the greatest beneficial effect. At well DH-30, arsenic concentrations have decreased from about 15 mg/L in 2011 (pre-SPHC IM implementation) to about 6 mg/L, and arsenic concentrations at well DH-47 have also shown a slight overall decrease. However, as noted previously, groundwater arsenic concentrations at well DH-19R, downgradient of the former Acid Plant settling pond, have remained stable in the 10 to 15 mg/L range for more than 10 years, including during the recent post-SPHC implementation period. At the north end of the former Smelter Site, arsenic concentrations at wells DH-17 and DH-64 have shown approximately 10 mg/L decreases over the same time period.

The current configuration of the selenium groundwater plume, based on monitoring data from October 2015, is shown in **Figure 3-5**. Recent data have shown that, similar to arsenic, selenium concentrations are currently decreasing at many wells within the former Smelter site, including former Acid Plant Area wells DH-30 (from about 0.25 mg/L in 2011 to about 0.05 mg/L currently) and DH-71 (from a pre-SPHC range of about 0.1 to 0.25 mg/L to about 0.06 mg/L currently). Wells within the West Selenium Area have also shown recent decreasing trends; concentrations at well DH-66, which were 4 to 5 mg/L throughout 2014, have decreased consistently throughout 2015 and are currently slightly less than 2 mg/L. While the current selenium concentration at well DH-66 is within the historically observed range, West Selenium Area well DH-8 decreased to the lowest concentration observed since the 1980s in October 2015 (0.745 mg/L). In contrast, selenium source wells in the Slag Pile area, such as wells DH-56 and DH-74, have not shown similar recent decreasing trends, with selenium concentrations remaining relatively stable.

The groundwater arsenic and selenium concentration decreases observed at some plant site wells are believed to be attributable at least in part to the lowering of groundwater levels, and the resulting isolation of waste mass in formerly saturated aquifer materials, through implementation of IMs at the site. The groundwater flow and geochemical systems are expected to continue to change over time in response to the IMs, and long-term monitoring likely will be necessary to fully evaluate the water quality responses to the IMs at the former Smelter site source areas and downgradient locations.

3.2.2 Source Area Characterization

In 2014 and 2015, SAIs were conducted at the North Plan Arsenic, West Selenium, Speiss-Dross and former Acid Plant source areas to better define contaminant concentrations, contaminant geochemistry, and soil properties. Samples collected in 2015 at the former Acid Plant Area are shown in **Figure 3-6**. Results of the 2015 SAI were presented in a September 9, 2015, meeting of the East Helena Groundwater Technical Working Group and incorporated into the predictive model (described in Section 3.3). Select slides from the September presentation summarizing the results of the former Acid Plant Area SAI are included in Appendix A. The 2015 SAI will be detailed in an upcoming report by Hydrometrics, Inc. planned for completion in January 2016. This section summarizes the results related to the nature and extent of arsenic, selenium, and cadmium in the former Acid Plant Area.

The former Acid Plant Area 2015 SAI consisted of four soil borings, with two of the borings completed as monitoring wells. Total arsenic, cadmium, and selenium concentrations in soils indicate impacts from historical plant activities. Average saturated zone concentrations in the four borings ranged from 71 to 340 mg/kg for arsenic, 119 to 561 mg/kg for cadmium, and 0.6 to 14 mg/kg for selenium. The highest average arsenic concentrations in the saturated zone were present in a boring completed within the former settling pond footprint. Soil leaching tests showed maximum unsaturated zone leachate concentrations of 15 mg/L arsenic, 66 mg/L cadmium, and 3.8 mg/L selenium, and maximum saturated zone leachate concentrations of 14 mg/L arsenic, 120 mg/L cadmium, and 1.6 mg/L selenium.

Groundwater data collected from soil borings and newly installed monitoring wells upgradient and downgradient of the former Acid Plant settling pond show arsenic concentrations increasing from 5 to 15 mg/L through the former settling pond area, with no apparent additional arsenic concentration increase beneath the HDS building downgradient of the former settling pond. Cadmium concentrations in the 2015 former Acid Plant Area soil borings and wells ranged from about 1 to 4 mg/L, while groundwater selenium concentrations were all relatively low (less than 0.01 mg/L). The results of the 2015 SAI in the former Acid Plant Area indicate ongoing arsenic and cadmium loading to groundwater from area soils, along with the potential for selenium loading to groundwater (given the total and soil leachate selenium concentrations observed).

3.3 Fate and Transport

Groundwater flow and fate and transport modeling has been calibrated to past and current groundwater conditions, and used to predict future groundwater conditions under IMs currently under construction and alternative source area corrective measures. The model conditions have been refined based on results of 2014 and 2015 source area investigations, ongoing groundwater monitoring, and additional calibration and sensitivity simulations. These refinements have included better definition of lithology contacts, extension of groundwater flow calibration time, and transitioning from steady-state (average) flow conditions to transient to better match site conditions. In addition, existing groundwater plume maps and time series plots are used to calibrate the fate and transport simulations over the extended time period for arsenic and selenium, both onsite and offsite.

Predictive simulations included 10-year transient flow and fate and transport for arsenic and selenium plumes. Predictive simulations for arsenic groundwater concentrations consisted of the following:

- IM baseline conditions (i.e. IMs that are currently under construction without added corrective measures)
- Former Acid Plant Area removal via soil excavation (simulated by using a 70 percent reduction of contaminant mass in the soil)
- Source control of the North Plant Arsenic Area, along with the former Acid Plant Area, using a 70 percent reduction of contaminant mass in soil

The 70 percent reduction in contaminant mass at the former Acid Plant Area was used to estimate the efficiency of a removal action based on investigations performed in the area, including the 2015 SAI, and the proposed excavation area footprint. The 70 percent reduction in contaminant mass at the North Plant Area was also used to simulate multiple corrective measure alternatives. Preliminary modeling runs using steady-state flow conditions demonstrated that each simulated corrective measure could be similarly simulated using a 70 percent reduction assumption.

The arsenic predictive modeling evaluation considered changes in offsite plume volume, mass of arsenic leaving the site in groundwater (flux rate), and onsite arsenic groundwater concentrations. The predictive results for arsenic can be summarized as follows:

- The offsite groundwater plume extent (based on the MCL) is relatively unchanged for:

  - current IM implementation from 2011 to 2014,
  - the scenario of just former Acid Plant source removal, and
  - the scenario of former Acid Plant Area and North Plant Arsenic Area removal.

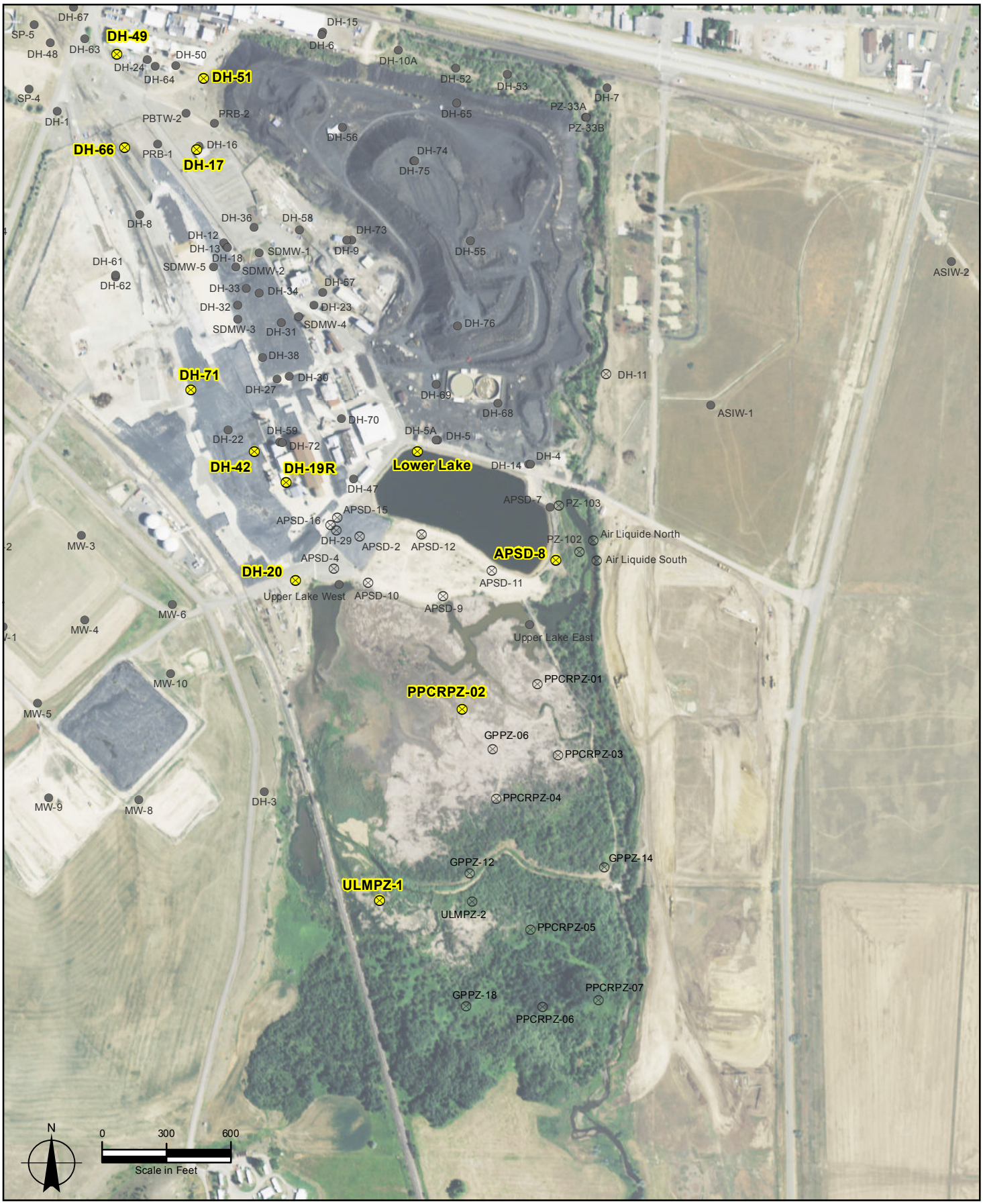
- The offsite flux rate of arsenic in groundwater is expected to be reduced by 66 percent under current IM implementation with or without former Acid Plant Area source removal. However, modeled groundwater arsenic concentrations onsite decreased in response to AP Source Removal IM.
- Onsite groundwater arsenic concentrations did not reach an equilibrium within 10 years, and consequently additional simulations were run for 30 years. Groundwater concentrations continued to decrease onsite after 30 years, with lower concentrations resulting from AP Source Removal IM.

Predictive modeling results indicated that the AP Source Removal IM will result in further reduction of onsite groundwater concentrations and within a shorter period than without the removal.

3.4 Conclusions

Groundwater levels in the former Upper Lake Marsh Area and the former Smelter site continue to decline in response to the SPHC IM components implemented to date. Groundwater levels in the marsh area have declined by up to 10 feet, in part as a result of active construction dewatering in 2015 to support the PPC Realignment project, but also to draining of Upper Lake, diversion of PPC to the temporary bypass channel, and excavation and dewatering of TPA. On the former Smelter site, groundwater levels have declined from more than 7 feet in the area of the South Plant, to as much as 9 feet in the northwest portion of the former Smelter site. Groundwater levels in the former Acid Plant Area have declined more than 5 feet. Additional water level declines are anticipated in response to the PPC Realignment.

The water level declines recorded on the former Smelter site are believed to be contributing to the reduction in contaminant concentrations documented in the West Selenium and North Plant areas in 2015. The 2015 SAI identified elevated contaminant concentrations (arsenic, cadmium, selenium) in soils at the former Acid Plant Area to depths of 30 feet or more, where saturated conditions are expected to persist post-SPHC IM. Despite improvements in groundwater quality recorded since the inception of the SPHC IM, currently stable groundwater arsenic (and cadmium) concentrations indicate that the former Acid Plant Area soils continue to act as a source of contaminant loading to groundwater, and are expected to do so post-SPHC IM. Although groundwater selenium concentrations in this area are currently low, elevated selenium concentrations in site soils indicate that the former Acid Plant Area soils could leach selenium to groundwater in the future if groundwater geochemical conditions change. As a result of the current arsenic and cadmium loading to groundwater, the potential for future selenium loading, and waste mass accessibility, removal of the more contaminated soils associated with the former Acid Plant settling pond is planned for 2016.



V:\12015\GIS\IMWP2015-2016\WaterLevel_WellFigure_Update.mxd Date Saved: 11/19/2015 8:36:00 AM EN11181510043PDX 656187.54.01.02 v2 11-20-14 gr

Hydrometrics, Inc
Consulting Scientists and Engineers

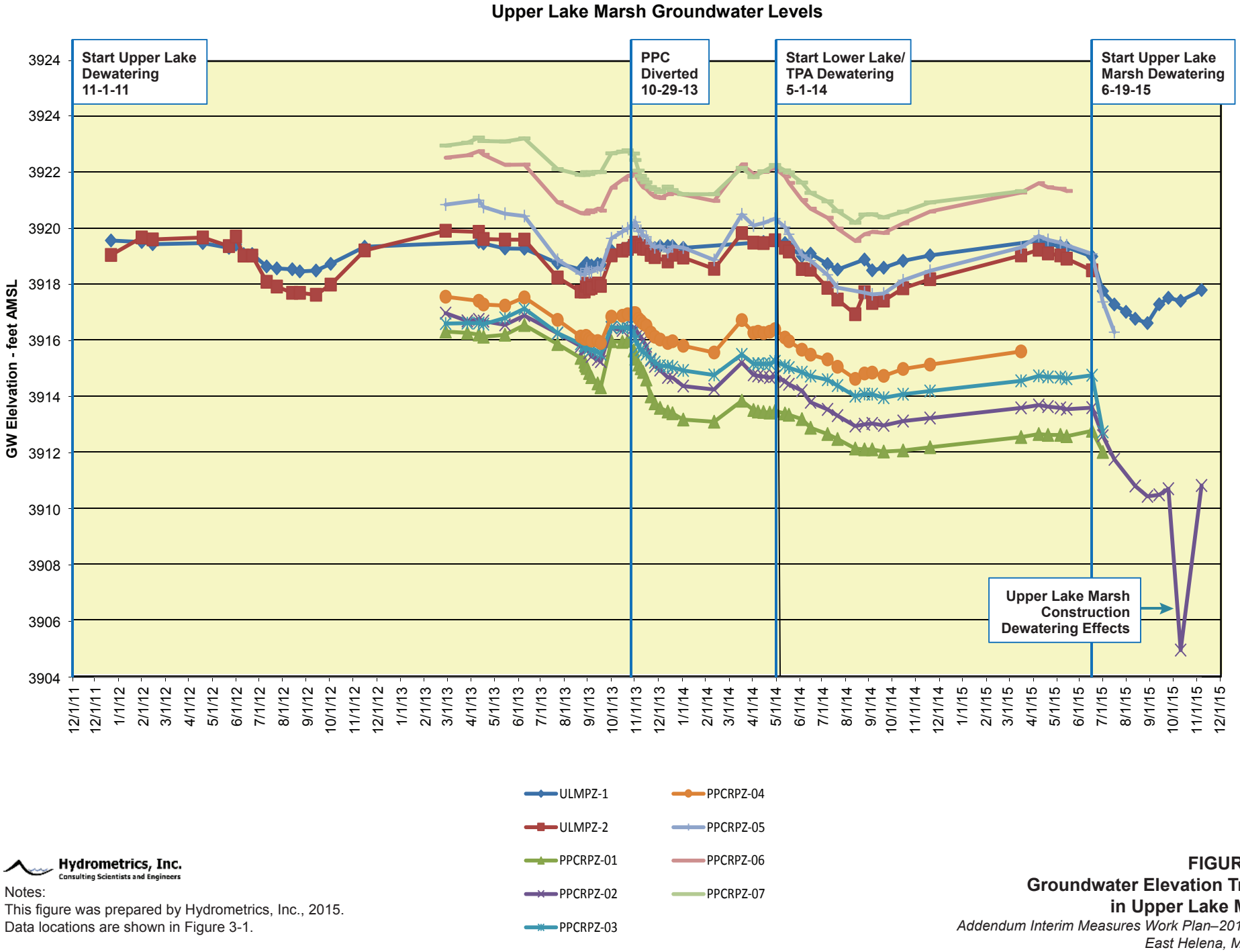
Note: This figure was prepared by Hydrometrics, Inc. in 2015.

Legend

- Groundwater Level Monitoring Well
- Abandoned Well
- Existing Site Well

FIGURE 3-1
Plant Site Area Monitoring Wells/Peizometers
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

ch2m

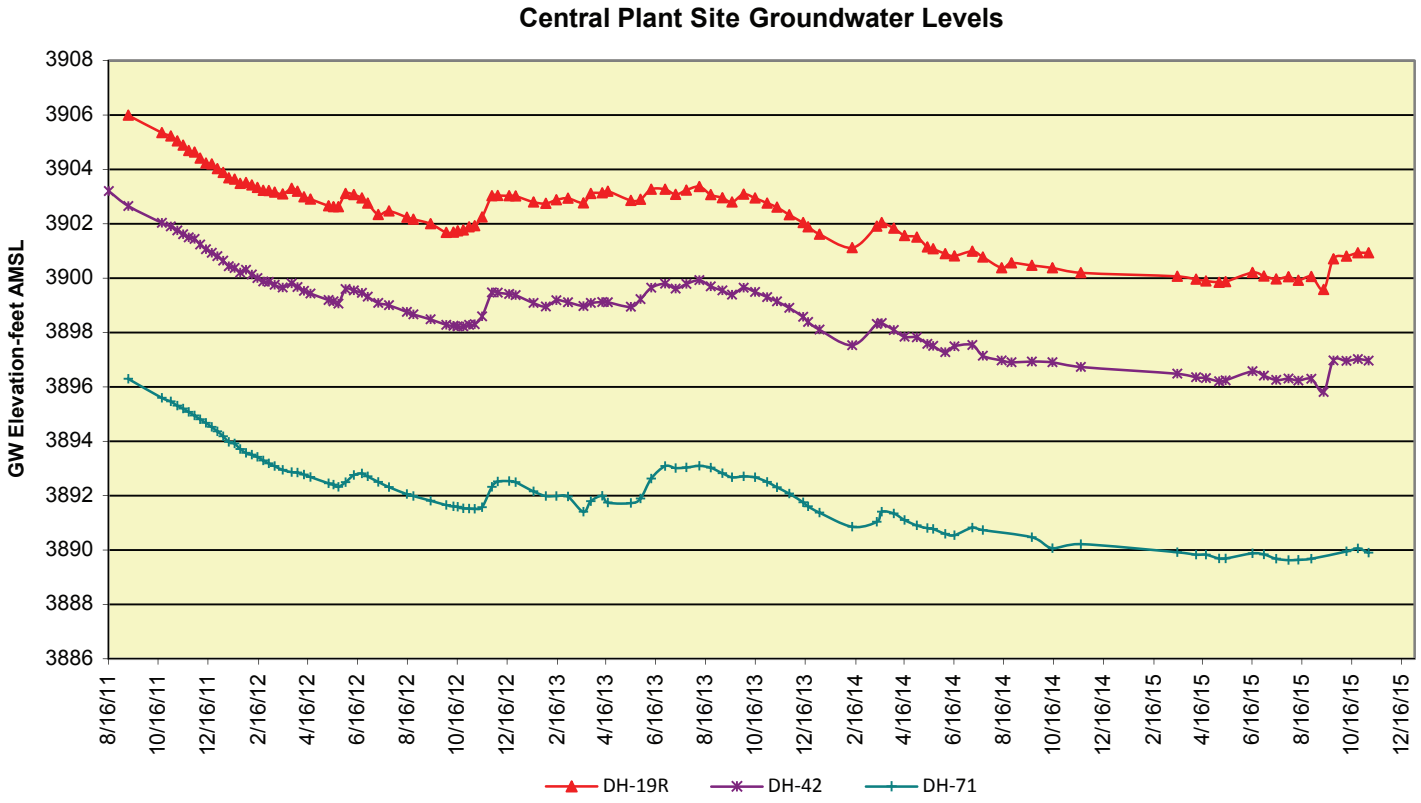


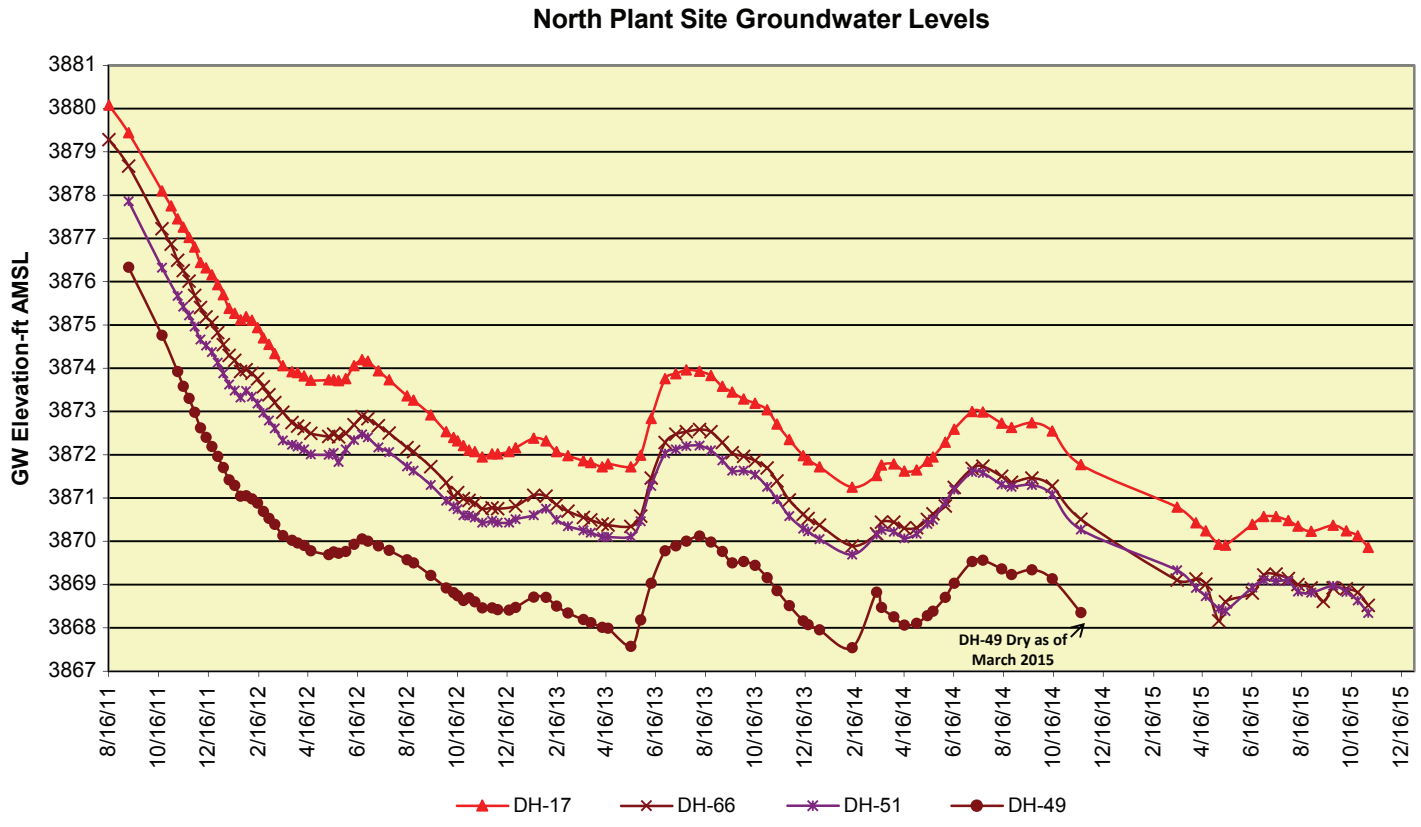
Hydrometrics, Inc.
Consulting Scientists and Engineers

Notes:
This figure was prepared by Hydrometrics, Inc., 2015.
Data locations are shown in Figure 3-1.

FIGURE 3-2
Groundwater Elevation Trends in Upper Lake Marsh
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

ch2m



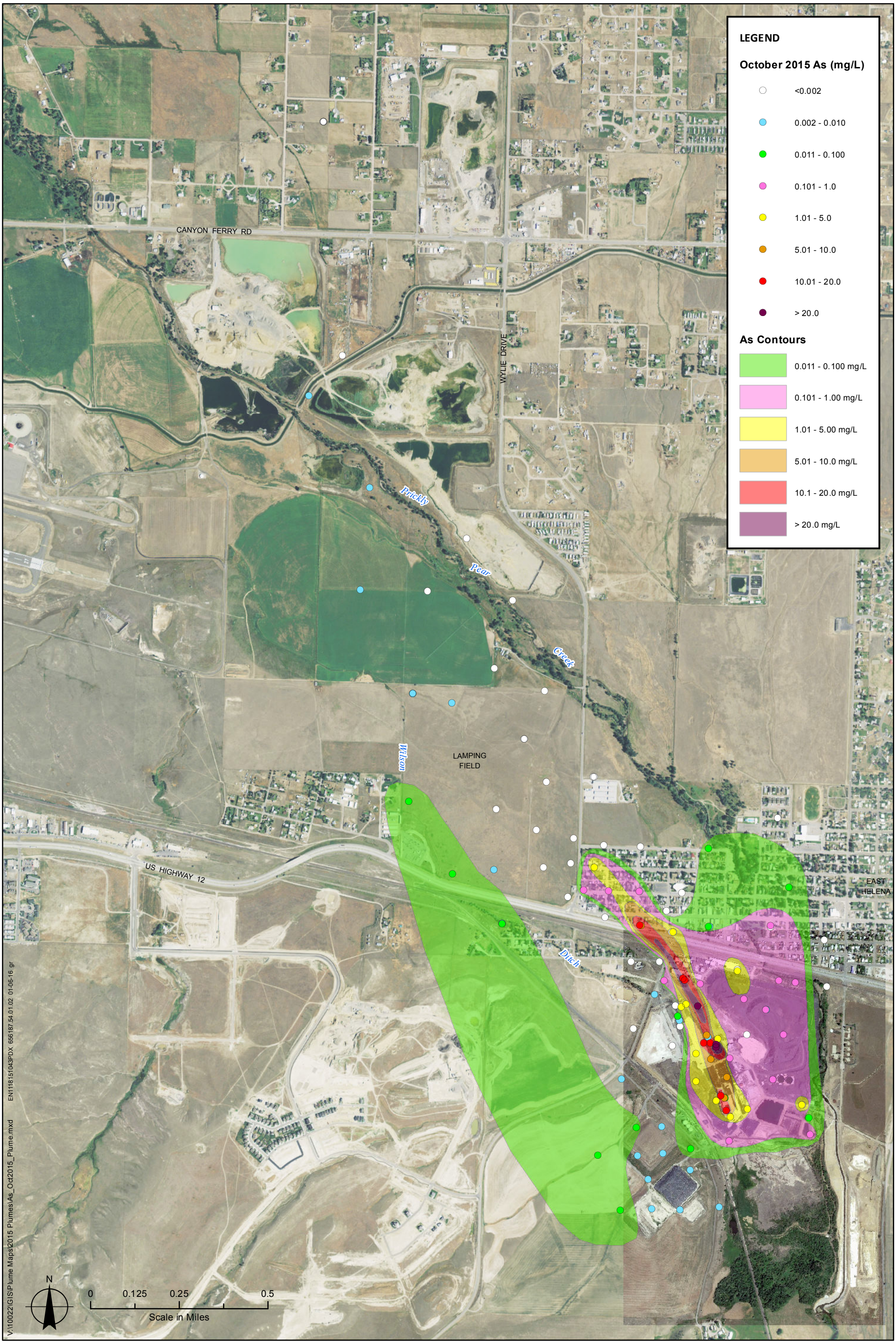


Hydrometrics, Inc.
Consulting Scientists and Engineers

Notes:
This figure was prepared by Hydrometrics, Inc., 2015.
Data locations are shown in Figure 3-1.

FIGURE 3-3
Groundwater Elevation Trends in Plant Site Wells
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

ch2m:

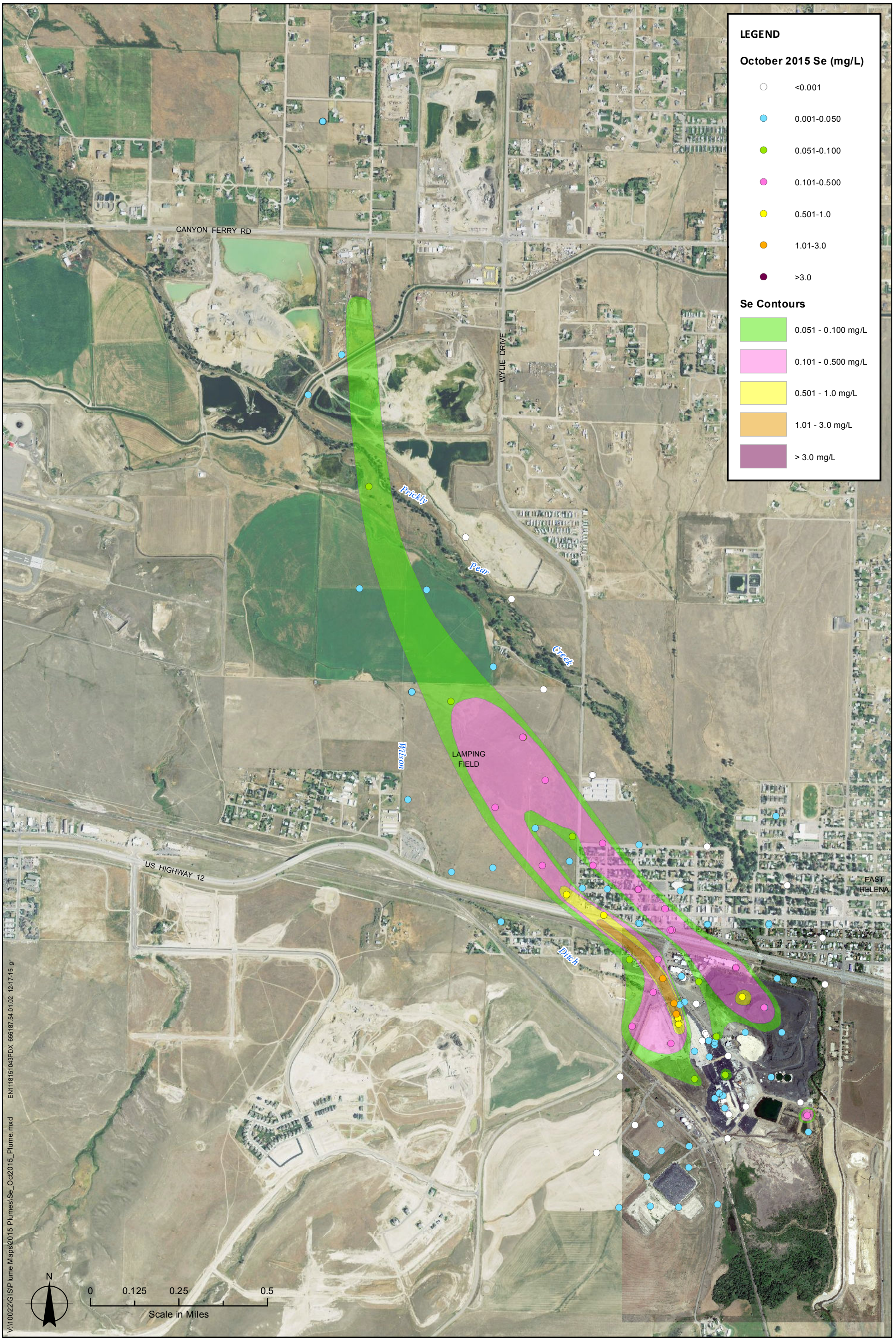


Notes:
As = arsenic
mg/L = milligrams per liter
This figure was prepared by Hydrometrics, Inc. in 2015.

Hydrometrics, Inc
Consulting Scientists and Engineers

Figure 3-4
October 2015 Dissolved Arsenic Plume
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

ch2m



Notes:
Se = selenium
mg/L = milligrams per liter
This figure was prepared by Hydrometrics, Inc. in 2015.

Hydrometrics, Inc
Consulting Scientists and Engineers

Figure 3-5
October 2015 Dissolved Selenium Plume
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

ch2m

Figure 3-6
2015 Source Area Investigation Sample Locations
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

Hydrometrics, Inc
Consulting Scientists and Engineers

Note: This figure was prepared by Hydrometrics, Inc. in 2015.

ch2m:

SECTION 4

Data Sufficiency

Data developed to date are sufficient to support the conceptual development of the AP Source Removal IM, construction design, and planning. The IM Work Plan 2015/2016 summarizes the data collected and incorporated into the IMs currently being implemented. The additional data collected and subsequent evaluation conclusions to support the AP Source Removal IM presented in this Addendum are summarized as follows:

- Hydrogeology—The 2015 SAI fieldwork has been completed. Corrective action groundwater monitoring is ongoing, but the most recent data have been used to supplement the understanding of groundwater conditions at the former Smelter site for the purpose of evaluating the IM described herein.
- Groundwater Flow and Fate and Transport Models—These models were used to assess the predicted benefits of conducting corrective measures, including the AP Source Removal IM.
- Stormwater flows, chemistry, and discharge data—Data are available from the personnel operating the HDS WTP. Data are collected as required under the current Montana Pollutant Discharge Elimination System (MPDES) permit and stormwater permits.
- Utility types and locations— Existing utility drawings and underground utility information obtained by the Custodial Trust have been used to identify and locate as many underground utilities as possible. Relocations and/or decommissioning are being performed in conjunction with IM construction implementation.
- Structures— ASARCO engineering drawings available onsite have been compiled and reviewed as needed for demolition.
- Borrow sources and geotechnical data— The results of the 2015 SAI at the former Acid Plant Area were used to estimate quantities of construction materials, assess mixing ratios, and estimate the potential for elevated metals concentrations in construction dewatering water for treatment.

SECTION 5

Engineering Design and Construction Information for Proposed Source Removal

This section summarizes engineering design and construction activities planned for 2016 associated with the AP Source Removal IM. A schedule for task implementation is provided in Section 8.

5.1 Key Design Objectives

The key design objective of the AP Source Removal IM is to remove accessible, high-concentration material from the saturated zone at the former Acid Plant Area that may be contributing to groundwater impacts at the site. Demolition and removal of the former Acid Plant Area structures planned as part of the ET Cover System IM in 2016 will provide access to previously inaccessible source material. **Figure 5-1** shows the design and construction details for the IM. The major objectives used to develop the design of the AP Source Removal IM are as follows:

- Schedule demolition of existing former Acid Plant Area structures to provide sufficient time to complete the AP Source Removal IM in 2016.
- Protect and preserve infrastructure associated with the HDS WTP to allow continued operation as necessary to treat stormwater and other remediation waters.
- Conduct the AP Source Removal IM to allow continued operations at the site.
- Use the HDS WTP for treatment and disposal of water generated during excavation, in compliance with the site's MPDES permit.
- Implement construction "best management practices" to minimize erosion of contaminated soil as it is excavated and then placed within the ET Cover System.
- Perform all work in a manner that is protective of human health and the environment, efficient, and cost-effective in accordance with applicable health and safety plans.
- Provide protection from groundwater infiltration during the demolition activities by limiting the amount of time bare soil is exposed at the ground surface.
- Manage excavated material by placing it within or beneath the ET Cover System IM.
- In consultation with USFWS, avoid to the extent possible and technically feasible the disturbance of migratory bird nest areas during nesting season.

5.2 Design and Construction Features

Former Acid Plant Source Removal IM activities will be preceded by demolition activities that will remove all remaining buildings, structures, debris, utilities, and other features within the vicinity of the source removal footprint within the former Acid Plant Area. The work will be sequenced to maintain functionality of the HDS WTP through 2016, or longer if needed, and associated portions of the stormwater collection and storage system. Demolition of structures will be conducted as described in the IM Work Plan 2015/2016 (CH2M HILL, 2015a), with the exception of the sequencing required to keep the HDS Plant functional through 2016. For the remaining activities, the design and construction features meet the following design criteria:

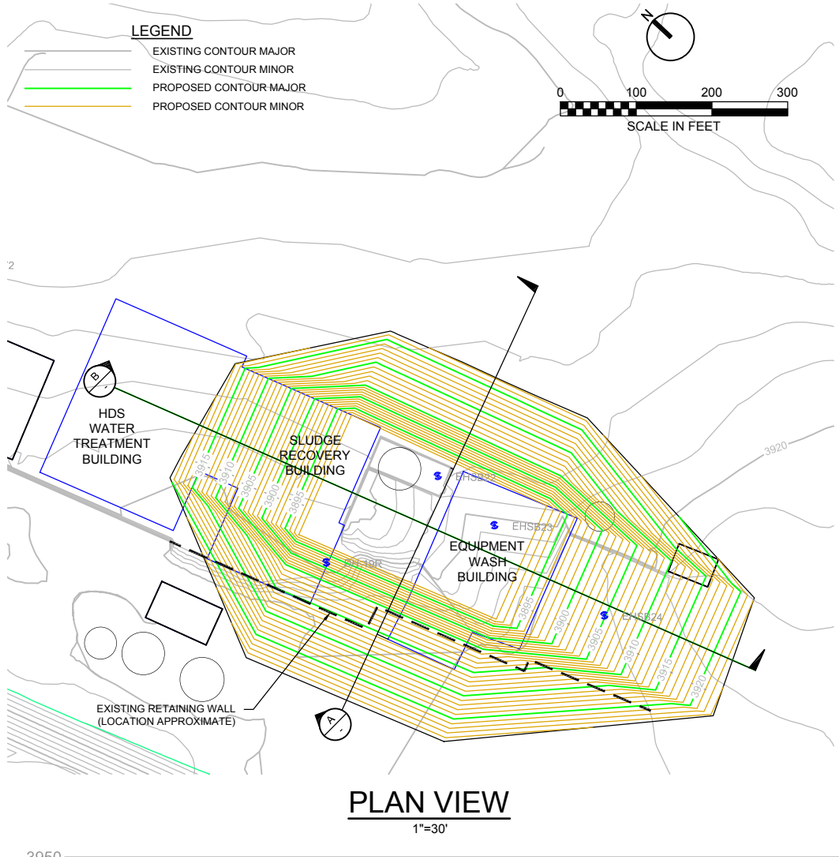
- Demolish the above-grade concrete walls, slabs, foundations, and footings of the Equipment Wash and Sludge Recovery Buildings, and an existing retaining wall (**Figure 5-1**) to access the former Acid Plant Area. Before demolition, disconnect the utilities servicing these structures, while maintaining service to the HDS WTP.

- Remove approximately 14,000 cubic yards of contaminated soil in a single excavation event.
- Place and protectively manage excavated soils and materials within the central corridor of the final ET Cover System (**Figure 1-1**).
- Remove groundwater from the excavation, treat it within the HDS Plant, and discharge to the existing outfall.
- Backfill to an elevation no less than 10 feet above the seasonal high groundwater surface elevation with clean borrow soil from the onsite East Bench borrow area and compact the excavation in a manner that provides an incompressible, void-free fill to prevent detrimental settlement. Use spoil material to backfill the upper reaches of the excavations,
- Consider soil stabilization measures for final configuration of the excavated surface and stabilize sidewalls of the excavation by laying back slopes.
- Collect post-removal soil samples within the excavation to document the conditions of the material left in place.

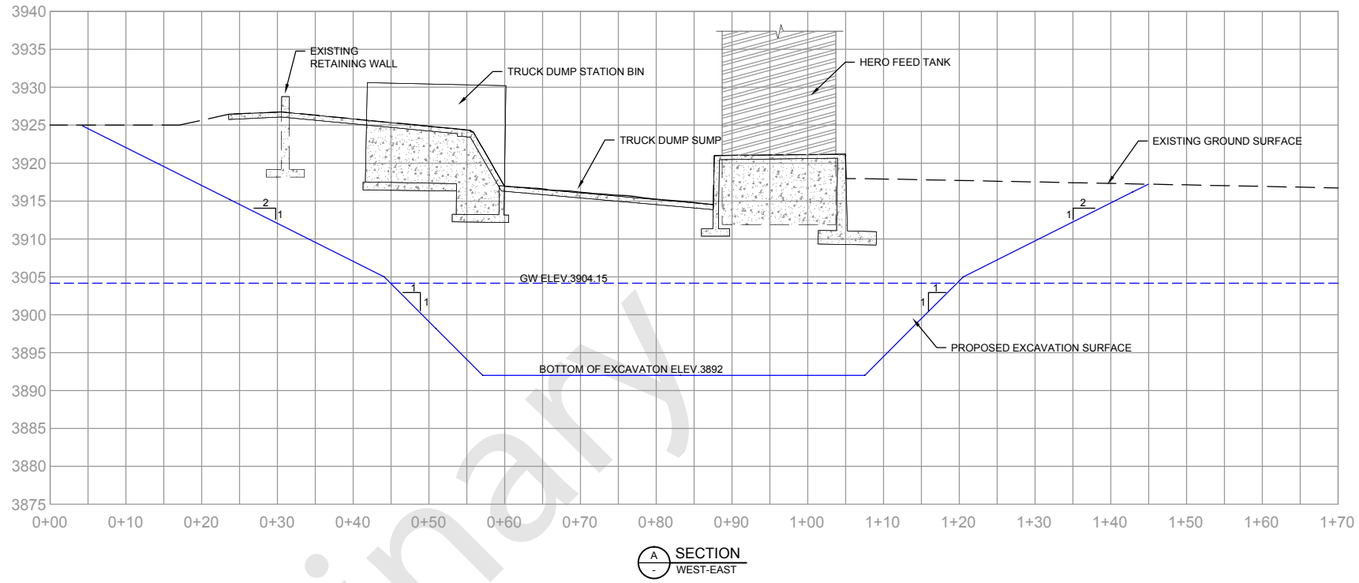
5.3 Construction and Quality Management

Key construction and quality management activities and issues associated with demolition are summarized in the IM Work Plan 2015/2016 (CH2M HILL, 2015a). Key construction and quality management activities and issues associated with the AP Source Removal IM are as follows:

- The mechanical demolition and source removal excavation will be sequenced to establish safe working conditions.
- The approach used to conduct the AP Source Removal IM will minimize dust and waste, and prevent potential exposure to workers and to the community.
- Monitoring wells designated for removal or abandonment within the former Acid Plant Area will be removed or abandoned in accordance with the *Borehole Abandonment Plan for the Former Asarco East Helena Facility* (Hydrometrics, 2010). Wells will be abandoned in a manner that effectively and permanently prohibits the movement of water (vertically and horizontally) within the abandoned borehole. A borehole abandonment documentation form will be completed for each monitoring well that is decommissioned.
- Excavation activities for source removal will consist of various excavators removing soil from the designated footprint in a controlled manner with minimal dusting. Excavated material will be placed directly into dump trucks to be hauled and deposited in the designated area for subsequent ET covering. Excavated soils and materials will be disposed within the central corridor of the final ET Cover System.
- Source removal excavation will be designed and implemented to ensure sidewall and slope stability within the excavation footprint and provide for safe working conditions. Sidewall slopes will be designed based on geotechnical information from previous investigations and site boring logs, and utilizing experience from other onsite excavations.
- Excavation dewatering will be completed by excavating sump collection areas at low points in the excavation. Collected water will be decanted to remove settle-able solids and pumped to the onsite storage tanks for treatment at the HDS WTP.
- Backfill material will be placed within the excavated area and properly compacted in lifts in accordance to geotechnical recommendations and design requirements. The disturbed excavation area will be returned to original site grade.
- All work will follow Quality Assurance/Quality Control (QA/QC) guidelines outlined by the American Society for Testing and Materials, where applicable.



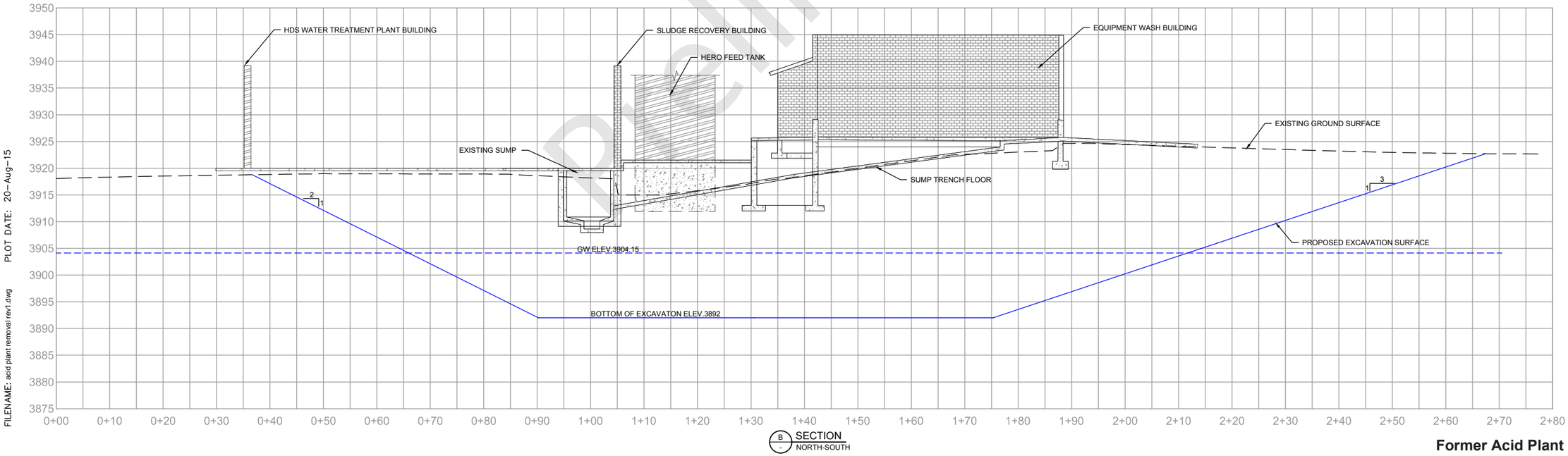
PLAN VIEW
1"=30'



A SECTION WEST-EAST

NOTES:

1. BACKFILL EXCAVATION TO A MINIMUM OF 10' ABOVE GROUNDWATER TABLE WITH EMBANKMENT FILL TYPE 1.
2. BACKFILL REMAINDER OF EXCAVATION WITH EMBANKMENT FILL TYPE 2 OR WEST BENCH BORROW.



B SECTION NORTH-SOUTH

PLOT DATE: 20-Aug-15

FILENAME: acid plant removal rev1.dwg

FIGURE 5-1
Former Acid Plant - Excavation Plan
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

ch2m

SECTION 6

Remediation Waste Management

This section describes the proposed approach for managing remediation waste associated with implementation of the proposed 2016 AP Source Removal IM components. Materials from the AP Source Removal IM will be managed under the ET Cover System, which is located entirely within the USEPA-approved Area of Contamination. Groundwater pumped as part of the construction dewatering activities will be treated in the HDS WTP and subsequently discharged in accordance to the current MPDES permit.

The remediation waste expected to be associated with implementation of the 2016 AP Source Removal IM components is summarized in **Table 6-1**. Detailed work plans, as appropriate, for each of the components described will be prepared during final design, or will be required submittals as part of the construction contract(s).

TABLE 6-1
Interim Measures Remediation Waste Management
Addendum to Interim Measures Work Plan 2015/2016

IM Construction Phase	Remediation Waste	Disposition
2016		
All Phases of Work	PPE and decontamination waste	Transport heavily soiled PPE and solid decontamination waste to appropriately permitted offsite disposal facility
Excavation Phase	Soil	Soil will be consolidated within the ET Cover System footprint
	Construction Dewatering	Manage water from construction dewatering activities within the work areas, treat, and discharge in accordance with MPDES Individual Discharge Permit

Notes:
ET = Evapotranspiration
MPDES = Montana Pollutant Discharge Elimination System
PPE = personal protective equipment

SECTION 7

Status of Permitting Activities and Approvals

This section summarizes the existing permits that will require modification as part of the AP Source Removal IM. The IM Work Plan 2015/2016 (CH2M HILL, 2015a) provides the details of all of the active permits that have been authorized to support ongoing IM construction. The Administrative Order of Consent was approved by the Montana Department of Environmental Quality (MDEQ) on September 29, 2015.

All work identified in this Addendum will be operated and managed under the current approved site-wide permits as described in Section 7 of the IM Work Plan 2015/2016 (CH2M HILL, 2015a). Activities related to the AP Source Removal IM that will be performed in accordance with approved permits are listed below:

MPDES Construction Activity General Discharge Permit: Stormwater discharges associated with AP Source Removal IM activities will be conducted in accordance with the MPDES Construction Activity General Discharge Permit approved on June 18, 2015. The IM design includes all necessary sediment controls needed to meet the applicable requirements of this Permit.

Stormwater Pollution Prevention Plan (SWPP): All construction activities will be performed in accordance with the approved site-wide SWPPP. An updated SWPPP, representing current site conditions, was submitted to the MDEQ on November 10, 2014. The SWPPP may be updated, as necessary, based on changing site conditions and construction activities that may not be covered under the current SWPPP.

HDS Plant Discharge: HDS Plant discharge is covered under the MPDES Individual Discharge Permit that has been extended under the Administrative Order of Consent (MDEQ, 2015). This permit will cover water generated by dewatering of the excavation that will be pumped directly to the HDS WTP for treatment.

SECTION 8

Project Management and Schedule

This section presents updates to the previous IM Work Plan 2015/2016 (CH2M HILL, 2015a) project management activities and proposed schedule.

8.1 Organization and Lines of Communication

The Custodial Trust will procure the services of consultants and contractors to implement the IMs as efficiently and cost-effectively as possible. **Figure 8-1** shows the current overall Project Organization Chart and the lines of communication. **Table 8-1** identifies the consultant leads for IM design and construction.

TABLE 8-1
Interim Measures Consultant Leads
Addendum to Interim Measures Work Plan 2015/2016

Name	Lead Contact	Description of Role
CH2M	Jay Dehner: 509-979-5733	Project management and overall engineering design and construction lead for former Smelter site IMs
Hydrometrics	Bob Anderson: 406-443-4150	Hydrogeology and engineering design
	Mark Rhodes: 406-443-4150	Construction Management/Oversight

8.2 Public Participation

Public involvement is a critical part of the overall cleanup process for the former Smelter site. General communication with the public will continue to follow the *Draft Community Relations Plan, Former ASARCO Smelter Facility, East Helena, Montana* prepared by the Custodial Trust (2010), as well as the requirements of the First Modification to the 1998 Consent Decree. An information and public comment meeting was held in February 2015 to provide the community with an overview of the 2015 and 2016 IM work described in the IM Work Plan 2015/2016 (CH2M HILL, 2015a), including a summary of the ongoing source control evaluations used to select the source removal IM described in this Addendum. In addition, the Custodial Trust holds meetings with the East Helena Entire Cleanup Team in Coordination group to provide information to key local stakeholders and attends the East Helena City Council meetings. The Custodial Trust's Web site contains links to news on cleanup progress, design documents, meeting materials, and future meeting dates. The Web site address is: http://www.mtenvironmentaltrust.org/east-helena.

An information and public comment meeting will be held in January 2016 (to be scheduled) to provide the community an overview of the work described in this Addendum. Written public comments on this document or ongoing activities may be submitted to:

Attn: Betsy Burns
USEPA Region 8 Montana Office
10 West 15th Street, Suite 3200
Helena, MT 59626

Submit electronic comments by e-mail to: burns.betsy@epa.gov.

8.3 Documentation and Reporting

The following IM implementation documentation is under development:

- Contract scopes of work and schedules

- Modeling results to be incorporated into the CMS Report
- Detailed engineering designs (plans and specifications)
- Construction contract packages (drawings and specifications)
- Record drawings and contract close-out documents

Core plans that have been developed for the Facility will be incorporated by reference, or amended as appropriate, to ensure that IM activities follow relevant protocols and methods. Core plans include the following:

- Health and safety plan for the East Helena former Smelter site
- QA/QC plan
- Sampling and analysis plans

IM progress will be summarized in the monthly progress reports.

8.4 Updated Interim Measure Implementation Schedule

Table 8-2 summarizes key dates for the proposed 2016 AP Source Removal IM implementation. The schedule is considered a living document and will be revised on a regular basis as needed to reflect planned implementation requirements. The preliminary schedule was developed in coordination with other ongoing work being conducted by the Custodial Trust pursuant to the First Modification. The schedule for these activities is subject to refinement as input is received from the Custodial Trust, beneficiaries, and other stakeholders. In addition, the schedule may be revised if additional source removal or control IMs are proposed as a result of ongoing corrective measures.

TABLE 8-2
Summary of Proposed Implementation Schedule
Addendum to Interim Measures Work Plan 2015/2016

East Helena Facility Planning and Construction Activities	Start	End
Addendum to Interim Measures Work Plan 2015/2016		
Public Comment Period	January 2016	February 2016
U.S. Environmental Protection Agency Approval		March 2016
2016—AP Source Removal IM		
Construction Pricing and Award	March 2016	March 2016
Construction	March 2016	June 2016

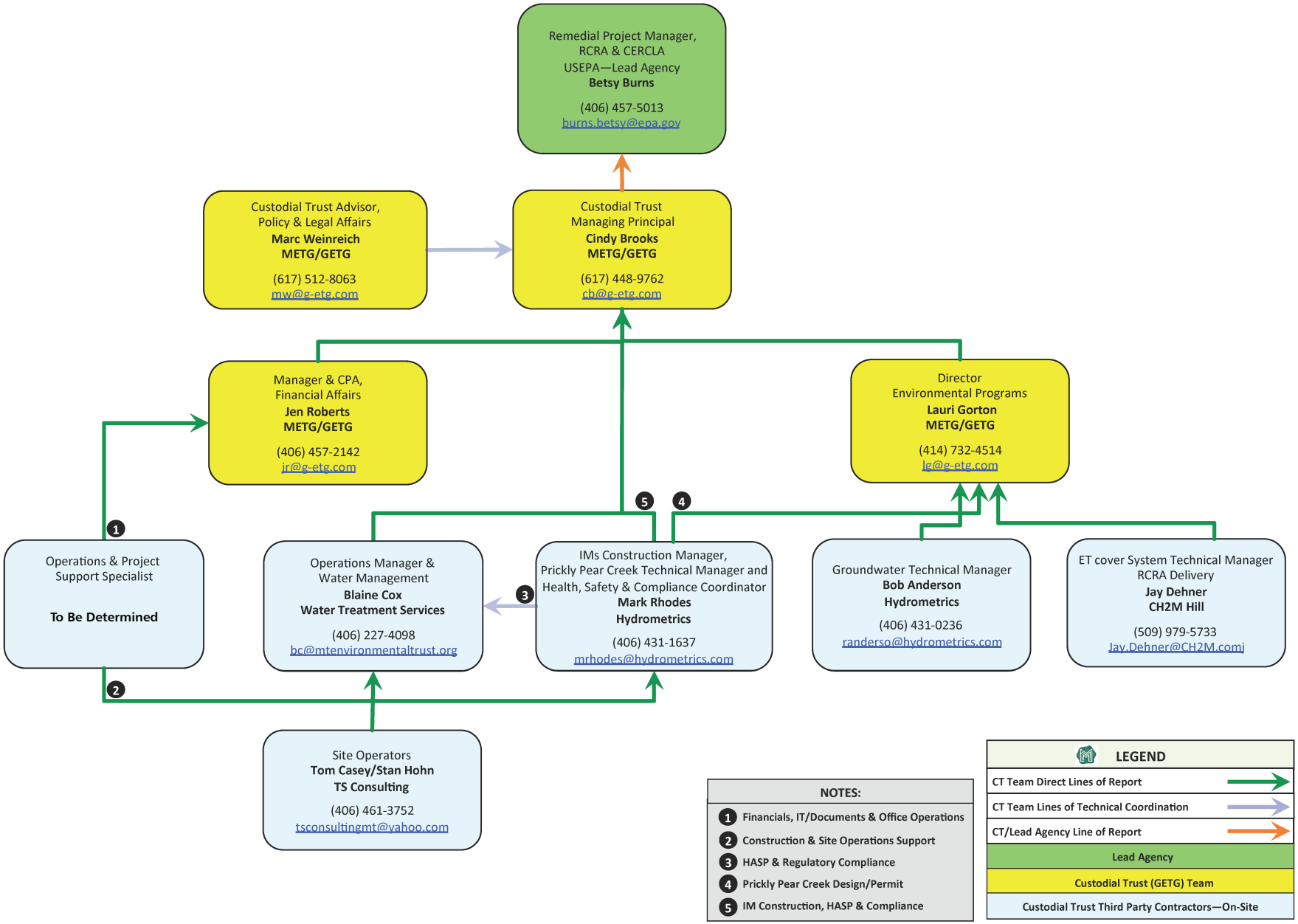


FIGURE 8-1
Project Organization and Lines of Communication
Addendum Interim Measures Work Plan–2015/2016
East Helena, Montana

SECTION 9

References

CH2M HILL. 2012. *Former ASARCO East Helena Facility Interim Measures Work Plan–Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities*. Final. Prepared for The Montana Environmental Trust Group, LLC, and the Montana Environmental Custodial Trust. September 2012.

CH2M HILL. 2015a. *Former ASARCO East Helena Facility Interim Measures Work Plan-2015 and 2016.* Final. Prepared for The Montana Environmental Trust Group, LLC, and the Montana Environmental Custodial Trust. May 2015.

CH2M HILL. 2015b. *Former ASARCO East Helena Facility Corrective Measures Study Work Plan*. Prepared for The Montana Environmental Trust Group, LLC, and the Montana Environmental Custodial Trust. October 2015.

Dreher, Robert G., E. Rockler, M.W. Cotter, L. Johnson/United States District Court for the District of Montana. 2012. First Modification to the 1998 Consent Decree. Civil Action No. CV 98-H-CCL. Case 6:98-cv-00003-CCL. Document 38. Filed January 17, 2012.

GSI Water Solutions, Inc. 2014. *Phase II RCRA Facility Investigation*, *East Helena Facility*. April 29, 2014.

Hydrometrics. 2010. *Borehole Abandonment Plan for the Former Asarco East Helena Facility*. Prepared for The Montana Environmental Trust Group, LLC, and the Montana Environmental Custodial Trust.

Hydrometrics. 2014. *Source Area Work Plan for the Former East Helena Smelter.* Final. Prepared for The Montana Environmental Trust Group, LLC, and the Montana Environmental Custodial Trust. November 2014.

Hydrometrics. 2015. *2015 Supplemental Source Area Characterization Work Plan.* Final. Prepared for The Montana Environmental Trust Group, LLC, and the Montana Environmental Custodial Trust. June 2015.

Montana Department of Environmental Quality (MDEQ). 2015. *Administrative Order on Consent*. MPDES Permit NO. MT0030147; FID 2438. September 29, 2015.

Montana Environmental Custodial Trust (Custodial Trust). 2010. *Draft Community Relations Plan, Former ASARCO Smelter Facility, East Helena, Montana*. May 2010.

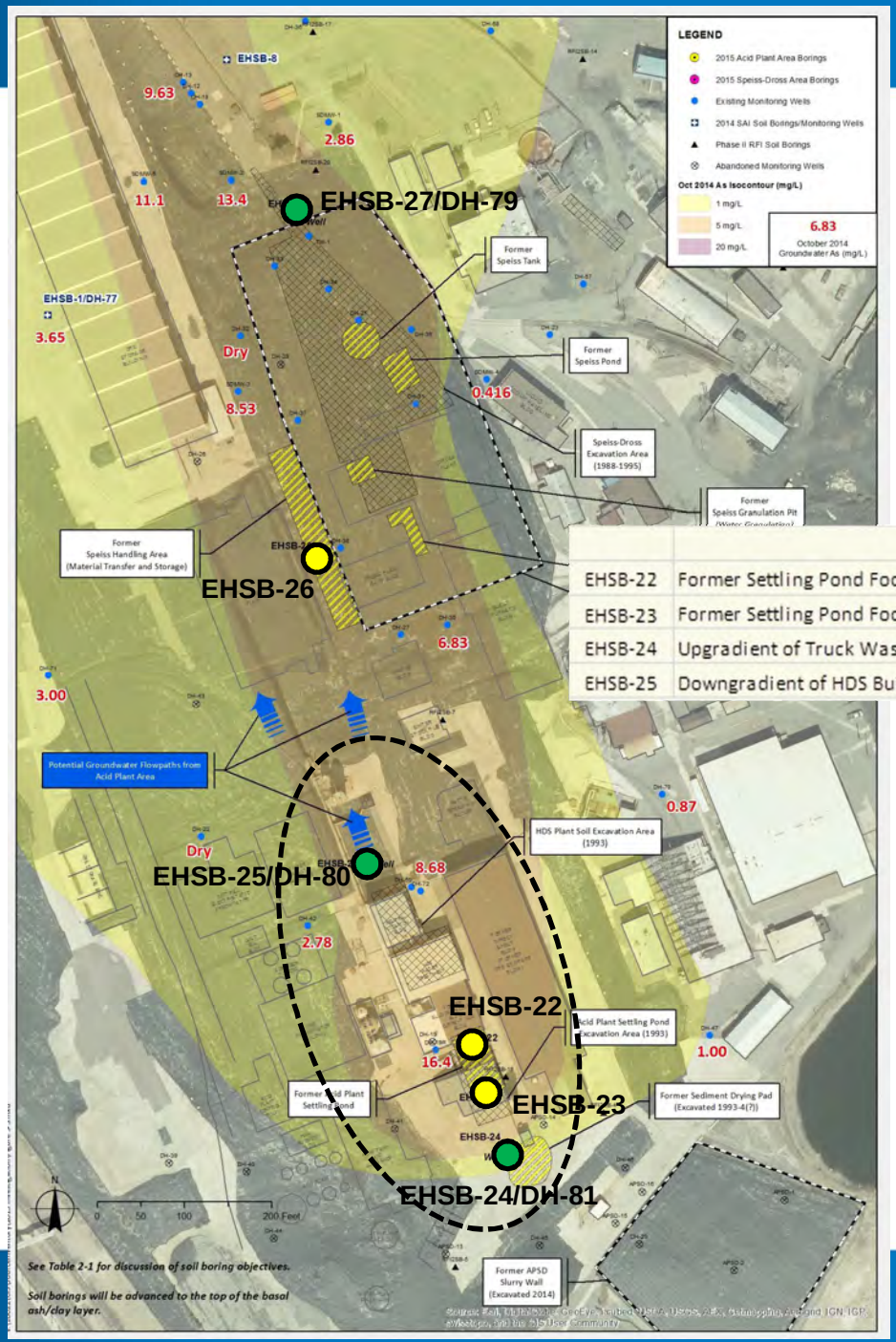
Appendix A
Summary of Former Acid Plant Area Investigation Results

Montana Environmental Trust Group
Trustee of the Montana Environmental Custodial Trust

EAST HELENA
GROUNDWATER TECHNICAL WORKING GROUP
MEETING
SEPTEMBER 16, 2015

2015 SOURCE AREA INVESTIGATION

RESULTS TO DATE

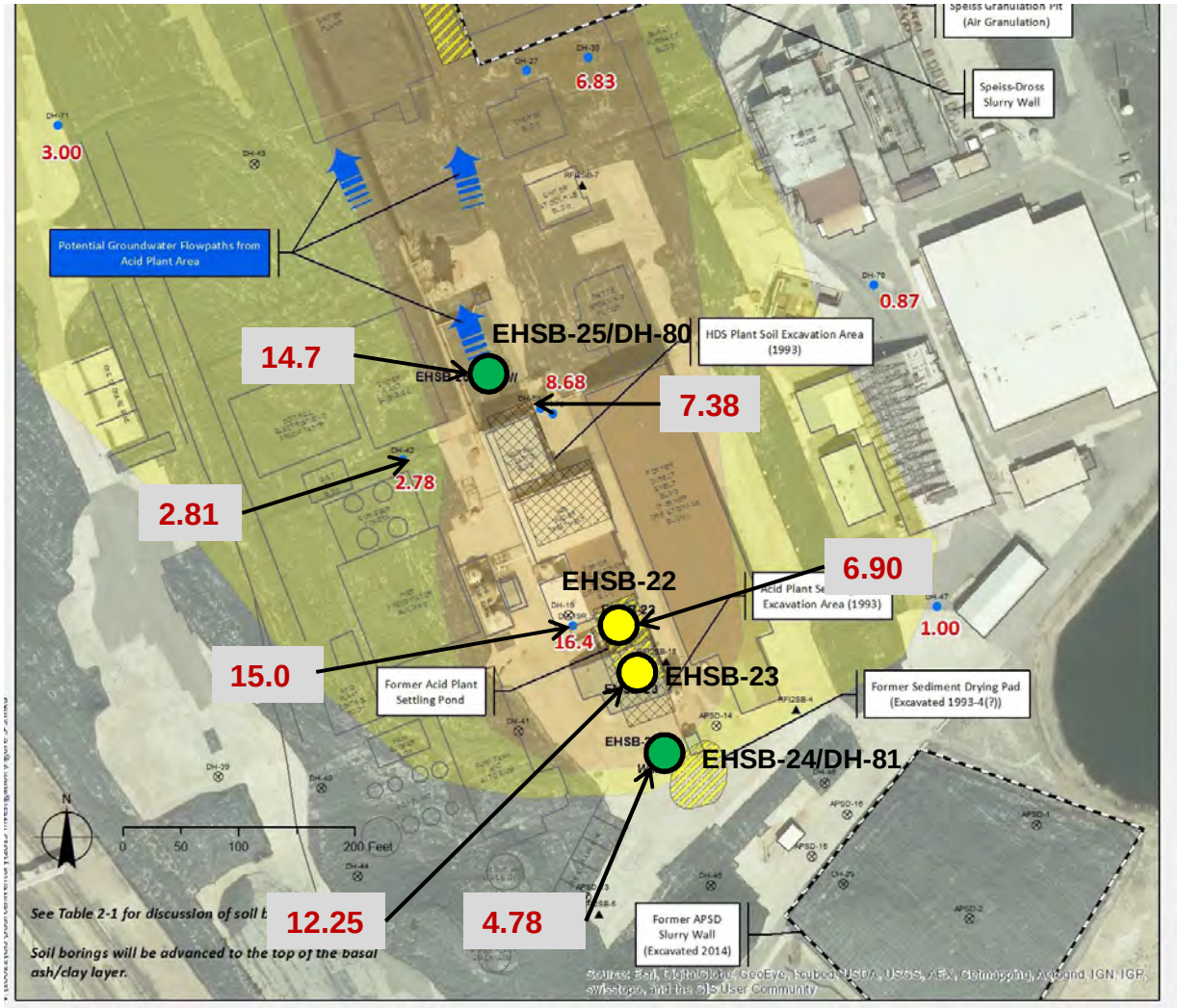


Acid Plant Area

- **4 Soil Borings/2 Well Completions**

		Total Depth	Depth to Ash	Well Designation
EHSB-22	Former Settling Pond Footprint, between truck wash and HDS	30.5	29	na
EHSB-23	Former Settling Pond Footprint in Truck Wash	33	31	na
EHSB-24	Upgradient of Truck Wash	32	30	DH-81
EHSB-25	Downgradient of HDS Building	32	29	DH-80

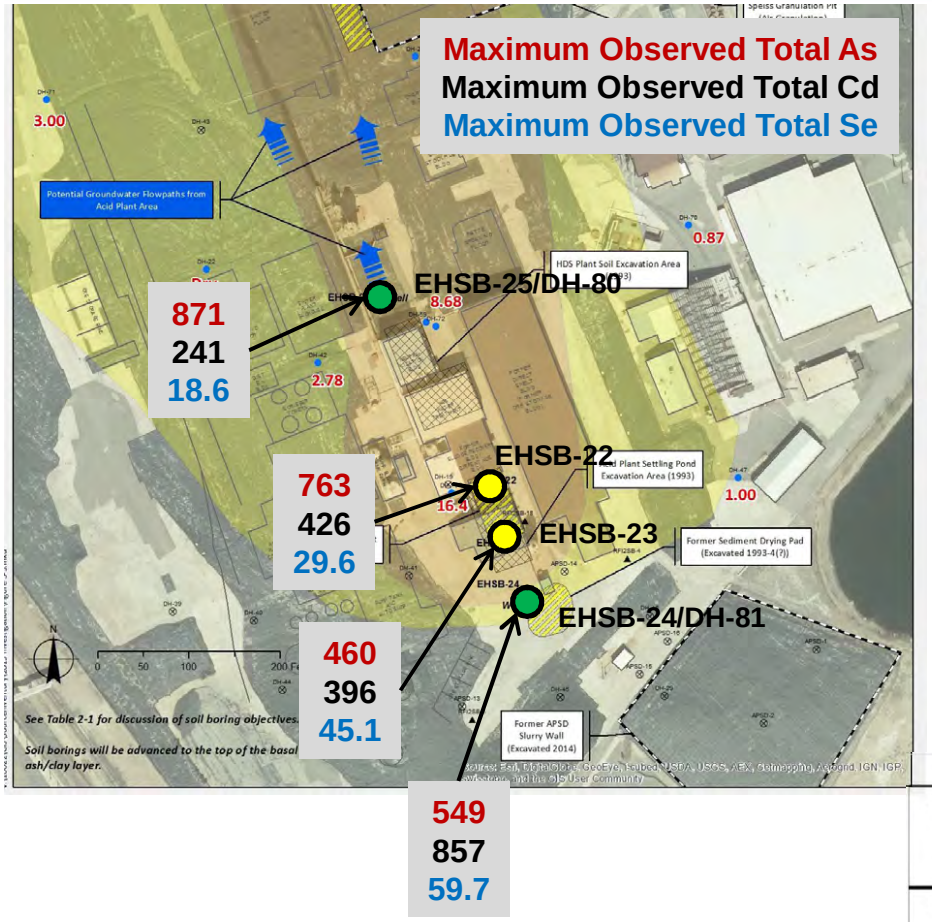
2015 SOURCE AREA INVESTIGATION



Groundwater As (mg/L)

Acid Plant Area - Groundwater

- Groundwater ~20 ft bgs, about 5 ft lower than pre-SPHC
- As spatial concentration trends define source locations
- Cd concentrations elevated at some wells (1 – 4 mg/L)
- Se concentrations low throughout (<0.001 – 0.029 mg/L)

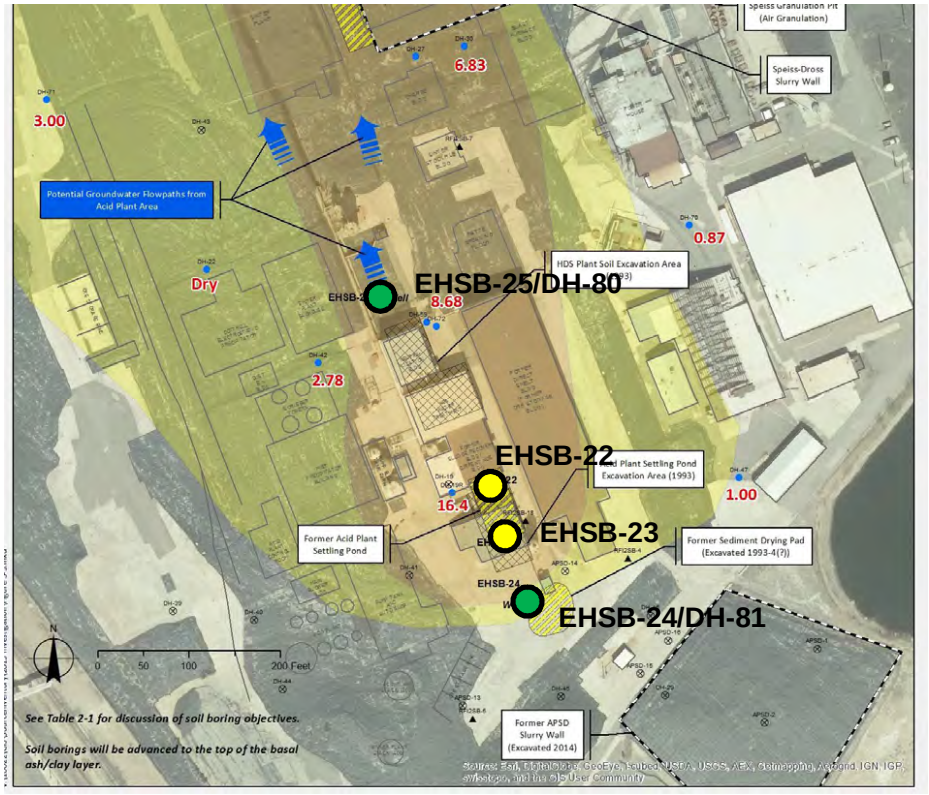


Acid Plant Area - Soils

2015 SOURCE AREA INVESTIGATION

- **Saturated zone As at EHSB-22, EHSB-23, EHSB-24 averages 150 to 400 mg/kg**
- **Unsaturated zone As 635 mg/kg at EHSB-25 (saturated prior to SPHC)**
- **Total Cd and Se also relatively high in soils – Cd near the highest on the plant site, Se higher than West Se area**
- **Cd leach concentrations up to 120 mg/L, As up to 15 mg/L, Se up to 3.8 mg/L – highest in former settling pond area, but variable between samples.**

		As	Ba	Cd	Se	Zn
EHSB-22 -Settling Pond	Ave-Unsaturated Zone	135	49	137	17	103
	Ave-Saturated Zone	394	135	160	3.2	195
	Ave - Ash	176	84	4	<0.6	68
EHSB-23 - Settling Pond	Ave-Unsaturated Zone	13	53	5	1	82
	Ave-Saturated Zone	151	50	160	28	143
	Ave - Ash	460	86	<1	<0.6	65
EHSB-24 - Upgradient	Ave-Unsaturated Zone	257	112	48	60	121
	Ave-Saturated Zone	316	97	596	10	492
	Ave - Ash	na	na	na	na	na
EHSB-25 - Downgradient	Ave-Unsaturated Zone	635	85	16	10	131
	Ave-Saturated Zone	93	66	159	1	161
	Ave - Ash	2	72	1	<0.6	56



Acid Plant Area – SAI Conclusions

- Soil As, Cd, Se concentrations indicate impacts from historic plant activities
- Cd highly leachable
- Cd in groundwater 1-4 mg/L; Se concentrations <0.05 mg/L
- Current information shows groundwater arsenic concentration/load increase (5 to 15 mg/L) through former settling pond; no apparent arsenic load increases beneath HDS building
- Well DH-81 ~5 mg/L arsenic, 3.5 mg/L cadmium; therefore some loading source to groundwater upgradient of former settling pond

Appendix B
Comments Received on Addendum to Interim Measures Work Plan—2015 and 2016, with U.S. Environmental Protection Agency Responses and Conditional Letter of Approval

To be inserted in final version of Addendum.