FINAL

Former ASARCO East Helena Facility Interim Measures Work Plan—Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities

Prepared for

The Montana Environmental Trust Group, LLC

Trustee of the Montana Environmental Custodial Trust

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CH2MHILL®

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Acronyms and Abbreviations

ACAP	Alternative Cover Assessment Program
ACM	asbestos-containing material
AMSL	above mean sea level
AOC	Area of Contamination
ASARCO	American Smelting and Refining Company
bgs	below ground surface
CAMU	Corrective Action Management Unit
CB	capillary break
CDGP	Construction Dewatering General Permit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CLOMR	conditional letter of map revision
cm	centimeter(s)
CMS	Corrective Measures Study
COC	constituents of concern
COPC	constituent of potential concern
CRP	*Draft Community Relations Plan, Former ASARCO Smelter Facility, East Helena, Montana*
CSM	conceptual site model
CWA	Clean Water Act
DNRC	Department of Natural Resources and Conservation
ET	evapotranspiration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FSAP	Field Sampling and Analysis Plan
ft^3/s	cubic feet per second
FWP	Fish Wildlife and Parks
HDPE	high-density polyethylene
HDS	high-density sludge
HEC-RAS	Hydrologic Engineering Centers River Analysis System
HSP	Health and Safety Plan
IM	interim measure
LBP	lead-based paint
LOMR	letter of map revision

LOSA	Lower Ore Storage Area
M	membrane
MCL	Maximum Contaminant Level
MDEQ	Montana Department of Environmental Quality
METG	Montana Environmental Trust Group, LLC
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
mm	millimeter(s)
MMI	Morrison Maierle Inc.
MPDES	Montana Pollutant Discharge Elimination System
MSW	municipal solid waste
MTSMP	Montana Stream Mitigation Procedure
NESHAP	National Emission Standards for Hazardous Air Pollutants
NWP	Nationwide Permit
OSHB	Ore Storage and Handling Building
OU	operable unit
PCB	polychlorinated biphenyl
POD	Point of Diversion
PPC	Prickly Pear Creek
PTS	Pioneer Technical Services
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SLV	screening-level value
SMCL	Secondary Maximum Contaminant Level
SPHC	South Plant Hydraulic Control
SWPPP	Stormwater Pollution Prevention Plan
TDS	total dissolved solids
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
yd^3	cubic yard(s)

SECTION 1

Introduction

The purpose of this Interim Measures Work Plan (IM Work Plan 2012) is to provide information to support U.S. Environmental Protection Agency (USEPA) conceptual approval of three interim measures (IMs) proposed for the East Helena Facility (Facility). In addition, this IM Work Plan 2012 provides information to support USEPA approval of three site preparation projects proposed for implementation in 2012 as the first IM components.

The IMs consist of three distinct corrective actions interconnected by common design and implementation components. The common components will collectively reduce the migration of contaminants in groundwater from the former Smelter site and thus contribute to the protection of public health and the environment. The IMs are summarized as follows:

- The South Plant Hydraulic Control IM (SPHC IM) will reduce the migration of groundwater by changing the hydraulics at the south end of the former Smelter site.
- The Evapotranspiration Cover System IM (ET Cover System IM) will reduce the potential for contaminants in soil to leach into groundwater by minimizing the amount of rainwater that percolates into the ground. The ET Cover System will also provide a clean surface to prevent human and ecological receptors from contacting contaminated soils.
- The Source Removal IM will excavate some of the more highly contaminated soils and consolidate them in a Corrective Action Management Unit (CAMU), thereby reducing the mass of contaminant loading to groundwater by eliminating several areas at the Facility where contaminants are a source of contamination to groundwater.

The specific site preparation projects proposed for implementation in 2012 are as follows (see Figure 1-1):

- Demolition of the buildings and infrastructure in the Lower Ore Storage Area (LOSA); required for implementation of the ET Cover System IM and the Source Removal IM
- Construction of a prefabricated steel bridge structure to be temporarily installed over the Smelter Dam to provide construction vehicle access between the former Smelter site and work areas east of Prickly Pear Creek (PPC); required for the ET Cover System IM and the Source Removal IM
- Relocation or abandonment of utilities located east of PPC on the east tertiary bench; required for the SPHC IM

The Montana Environmental Trust Group, LLC (METG), Trustee of the Montana Environmental Custodial Trust (Custodial Trust), is submitting this IM Work Plan 2012 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 Facility. As stated above, this IM Work Plan 2012 outlines the IM conceptual approach and design and describes the 2012 site preparation (construction) projects. Additional technical, design, and construction information will be provided in future submittals when detailed engineering and design plans are further developed.

This IM Work Plan 2012 is organized as follows:

- **Section 1: Introduction**.
- **Section 2: Interim Measures Conceptual Overview** provides an overview of the proposed conceptual approach to implementing the SPHC, ET Cover System, and Source Removal IMs and identifies the initial components to be implemented as site preparation projects in 2012.
- **Section 3: Conceptual Model of Contaminant Migration** describes the conceptual site model (CSM) for the former Smelter site, with a focus on contaminant migration conditions to be considered and addressed during the evaluation, design, and implementation of the proposed IMs.

- **Section 4: Data Sufficiency** summarizes the existing data used in the development of the IMs, determines whether additional data are needed to complete the design, and outlines the activities necessary to obtain additional data if necessary.
- **Section 5: Engineering Design and Construction for Proposed 2012 Projects** provides conceptual design information and outlines construction contracting and implementation considerations for the IMs to be performed in 2012.
- **Section 6: Remediation Waste Management** describes how hazardous and nonhazardous remediation waste will be managed during IM implementation.
- **Section 7: Required Permits** provides an overview of permit and licensing measures required to implement the 2012 construction projects and the conceptually proposed SPHC IM at the Facility.
- **Section 8: Project Management and Schedule** provides an overview of project management activities and the proposed schedule for IM implementation. Organizational structure, lines of communication, public participation, deliverables and reporting, and the schedule are described in this section.

Supporting information is provided in the following appendixes:

- **Appendix A** contains a summary-level discussion of the SPHC IM Upper Lake drawdown testing procedures and status. Upper Lake acts as a source of recharge to the site Upper Aquifer or unconfined groundwater system overlying the Tertiary ash/clay layer.
- **Appendix B** contains a series of tables summarizing the nature and extent of soil and groundwater at the Facility and the screening-level values (SLVs) used to assess potential threats to human or ecological receptors. The tables are derived from the draft *Phase II RCRA Facility Investigation Report* (draft Phase II RFI Report; GSI Water Solutions, Inc., 2011).
- **Appendix C** contains public comments on the June 2012 draft *Former ASARCO East Helena Facility Interim Measures Work Plan—Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities*, followed by USEPA responses. Comments were received from the Lewis and Clark County Water Quality Protection District, James Schell, the Lewis and Clark City-County Health Department, and the State of Montana (Montana Department of Justice and Montana Department of Environmental Quality).

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Not to Scale

FIGURE 1-1
Initial Interim Measures Components Proposed for Implementation in 2012
Interim Measures Work Plan–2012 Draft
East Helena, Montana

SECTION 2

Interim Measures Conceptual Overview

The main objectives of the SPHC, ET Cover System, and Source Removal IMs are to protect human health and the environment by:

- Reducing the contaminant mass migrating from the former Smelter site via the groundwater pathway.
- Eliminating the potential for people and wildlife to have direct contact with onsite surface soils containing high concentrations of inorganic contaminants.

This section provides a conceptual overview of the three IMs proposed for the Facility to meet these objectives, the interdependency among the three proposed IMs, and the first IM components proposed for implementation in 2012. The IMs will be evaluated as part of the Corrective Measures Study (CMS) process to determine whether they satisfy the remedial action objectives and remedy evaluation criteria for final remedies at the Facility or whether additional measures will be needed.

2.1 South Plant Hydraulic Control Interim Measure

2.1.1 Objective

The overall objective of the SPHC IM is to reduce both the mass and rate of migration of inorganic contaminants (primarily arsenic and selenium) in groundwater leaving the former Smelter site.

2.1.2 Description

The primary components of this IM are shown in Figure 2-1 and summarized as follows:

- Construction of prefabricated bridge decking on Smelter Dam; proposed for construction in 2012
- Construction of a temporary PPC bypass to route creek flow away from the south portion of the former Smelter site and allow the Upper and Lower Lakes to drain
- Realignment of PPC to areas of the east bench, potentially farther east of its current location
- Removal of Smelter Dam
- Relocation or decommissioning of utilities on the east tertiary bench, east of PPC; proposed for construction in 2012

The SPHC IM focuses on changing hydraulics on the south end of the site. As summarized in the draft Phase II RFI Report, much of the groundwater flow is driven by the recharge of surface water from Upper Lake, Lower Lake, and PPC. The surface water infiltrates through contaminated sediments and soils and then moves as groundwater through and off the former Smelter site to the north and northwest. Figures 2-2 and 2-3 (sections through Site A to A' for arsenic and selenium, respectively) illustrate Upper Lake's contribution to groundwater recharge at the former Smelter site. This standing water creates a hydraulic gradient across the south end of the site that drives groundwater through contaminated subsurface soils. Figures 2-4 and 2-5 provide conceptual illustrations of conditions at the south end of the site before and after implementation of the IM.

2.1.3 Benefits

Reducing the recharge caused by surface water will result in lower groundwater elevations at the south end of the site, and fulfillment of the following key criteria for achieving long-term cleanup goals for groundwater:

1. The volume of groundwater in direct contact with contaminated subsurface soils will be reduced, thereby reducing the transfer of inorganic contaminants from impacted soil to groundwater.

2. Lowering the groundwater elevations, especially in the South Plant area, will reduce hydraulic gradients across the former Smelter site, which will in turn decrease groundwater flow velocities and decrease the contaminant mass flux leaving the site at the northern, down-gradient boundary.

The SPHC IM is a passive groundwater remediation measure, meaning that it requires minimal engineered structures, active pumping, or in-situ installation to be implemented. As a passive measure, the SPHC IM provides a reliable means of controlling contaminant transport from the site, with limited long-term stewardship requirements and resources required to preserve the effectiveness of the IMs in the future. The performance of the SPHC IM will be monitored for several years following implementation of this interim measure to determine if and when additional groundwater remedies need to be implemented.

In addition to reducing the mass and rate of offsite groundwater contaminant migration, implementation of the SPHC IM is expected to result in the following benefits:

- **Flood Mitigation**. Several measures are being designed into the SPHC IM to mitigate the effects of future flood events associated with high flows in PPC:
  - The removal of Tito Park, Lower Lake, and the regrading of Upper Lake currently planned as part of the Source Control IM will provide additional flood storage capacity during high water events.
  - The enlarged floodway associated with realigned PPC will also provide additional storage of floodwaters and sediments during high-flow events.
  - Riparian areas will be included to encourage deposition of sand in reaches up stream of the City of East Helena.
  - The PPC realigned channel will be designed for additional meandering, length, and other attributes to lower stream velocities, which will further reduce flood risk.
- **Decreased Slag Load to PPC**. The proposed realignment of PPC will move the creek away from toe of the easterly side of the slag pile, which is currently eroding directly into PPC. The stability of the slopes on the east side of the slag pile will be improved by placement of fill material into the old channel bed. This will further reduce the potential for future erosion of slag into the creek.
- **Natural Resource and Recreation Opportunities.** Opportunities include the following:
  - Removal of the Smelter Dam and Upper Lake diversion structure will remove the one major barrier to fish passage on PPC.
  - The reconstructed PPC should provide improved aquatic habitat throughout the new channel.
  - Moving the realigned PPC away from the slag pile will create a buffer that improves safety for the general public accessing PPC.
  - Removal of Tito Park, Lower Lake, and the open water of Upper Lake will increase the wetlands area of the system by approximately 25 acres.

2.1.4 Technical Evaluations

Several evaluations have been conducted and are ongoing to assess the technical feasibility of the SPHC IM. The key information and studies are summarized in the following sections.

2.1.4.1 Preliminary Evaluation of Effectiveness

A preliminary evaluation of SPHC effectiveness was completed by GSI Water Solutions in 2011 (Technical Memorandum, *Preliminary Evaluation of South Plant Hydraulic Control at the East Helena Smelter Facility*, July 8, 2011). For this work, GSI completed a preliminary qualitative assessment of the potential for hydraulic control mechanisms in the Lower Lake/Tito Park/Upper Lake area (referred to as South Plant) to reduce groundwater levels in the southern portion of the former Smelter site.

The GSI work was conducted to evaluate whether implementing the SPHC IM would likely reduce contaminant loading to groundwater and subsequent transport of contaminants from onsite source areas to potential offsite receptors. A conceptual geologic cross-section of the South Plant area is provided in Figure 2-6. Possible SPHC IM activities considered in the evaluation included lowering or draining Upper and Lower Lakes and realigning PPC to a location further east of the former Smelter site. GSI conducted this qualitative evaluation to provide insights on the extent to which SPHC IMs might reduce groundwater levels and hydraulic gradients within the former Smelter site, and to identify the types of information and analysis necessary to evaluate this potential more rigorously.

The GSI report concluded that the SPHC IM is likely to be effective in lowering groundwater levels at the former Smelter site and reducing contaminant transport. The GSI report also concluded that draining both Upper and Lower lakes is likely to decrease groundwater levels at the south end of the site. Based on the limited data available at the time, the report also concluded that the horizontal hydraulic gradient in the southern half of the facility could be reduced by as much as 50 percent, with influence decreasing with increasing distance from the South Plant Area.

Additionally, the GSI report indicated that relocating PPC farther to the east of the former Smelter site may further "decrease groundwater levels and groundwater fluxes along the southern and central portions of the eastern property boundary."

Uncertainties noted in the GSI report included a lack of geologic and groundwater data farther to the east of the former Smelter site, making it difficult to predict if seepage from a realigned creek might migrate primarily westward back towards the former Smelter site or flow primarily northward or east from the realigned creek. GSI noted that lower groundwater elevations existed historically inside the northern portion of the property boundary during the former Smelter site's operating years when PPC was often dry because of large diversions for process water. The evaluations described in Sections 2.1.4.2 through 2.1.4.4 were designed to address the uncertainties identified in the GSI report.

2.1.4.2 Additional Evaluation of Groundwater Potentiometric Surface

A preliminary evaluation of groundwater potentiometric surfaces pre- and post-initiation of aquifer testing for SPHC was completed by Hydrometrics in February 2012. These surfaces reflect the expected change in groundwater elevations that could be realized by implementing the SPHC IM.

Figure 2-7 reflects groundwater elevations across the former Smelter site as measured in existing wells in October 2011. Figure 2-8 reflects estimated groundwater elevations across the former Smelter site following implementation of SPHC. As can be seen, an overall drop in groundwater elevations is expected. The estimated reduction in groundwater levels as a result of implementing the SPHC is expected to be most pronounced in the south portion of the former Smelter site. Reduction in groundwater level decreases with increasing distance from the South Plant area.

In addition to groundwater level declines, Figure 2-8 indicates a general flattening of groundwater gradients is expected to occur following SPHC implementation. This reduction in gradient is indicated by increased spacing between the estimated potentiometric isocontour elevations shown pre- and post-implementation of SPHC. Reduced gradients will be beneficial in contaminant migration control because the net effect will be slower movement of groundwater through the former Smelter site.

2.1.4.3 Upper Lake Drawdown Test

Upper Lake acts as a source of recharge to the plant site Upper Aquifer or unconfined groundwater system overlying the Tertiary ash/clay layer. Indications that Upper Lake provides recharge to the former Smelter site groundwater system include its location at the extreme southern (upgradient) end of the site, and the elevated lake level resulting from a berm constructed between the lake and PPC. Although these physical attributes indicate that Upper Lake increases recharge to the site Upper Aquifer (as compared to pre-lake conditions), the magnitude of recharge attributable to Upper Lake has not previously been quantified. In order to address this conceptual site model data gap, METG initiated an Upper Lake drawdown test to document the response of

former Smelter site groundwater levels and flow rates to reduced lake levels. The Upper Lake drawdown test was initiated in fall 2011 and continues to date.

Preliminary drawdown test results are summarized as follows:

- Groundwater level declines on the order of 3 to 5 feet in the south plant area, with groundwater levels continuing to decline.
- Groundwater level reductions will be greatest through the west and central sections of the former Smelter site where subsurface soil is highly contaminated.
- Results suggest that, although elimination of groundwater recharge from Upper Lake will not in itself mitigate all groundwater contaminant issues at the site, elimination of this recharge source, in conjunction with lowering and relocating PPC, will be an important component of the overall site groundwater mitigation plan.

Appendix A describes the Upper Lake drawdown testing procedures and status.

2.1.4.4 Groundwater Flow and Contaminant Transport Modeling

Groundwater flow and contaminant transport modeling was started by the Custodial Trust in March 2012. This modeling work is planned for a number of reasons, including analysis of the expected long-term effectiveness of SPHC. Initial flow modeling work activities will include collection and analysis of background hydrogeological data, development of the flow model, and initial calibration. Completion of the initial flow model calibration and the scope and schedule for follow-on flow modeling and contaminant transport analysis will be prepared later in 2012.

2.1.4.5 Flood Evaluations

A primary goal and a permitting requirement for the SPHC IM implementation is to avoid negative downstream flood impacts, especially to the City of East Helena. Because of this concern, and to provide information required for permits to construct the SPHC IM, floodplain modeling and evaluations will be prepared during detailed engineering. Results of the floodplain modeling effort will be made available to the general public and all agencies participating in the project.

The SPHC IM conceptual plans will enlarge the PPC floodplain and floodway in the area east of the former Smelter site. Additionally, removal of soil and sediment in Tito Park and Lower Lake (to be completed as part of the Source Removal IM), and the planned regrading of these areas, will further increase the flood plain. Taken in total, widening the floodplain along the realigned PPC by these combined actions is expected to have a positive impact on downstream flood risk. Removal of Smelter Dam is expected to lower the 100-year floodplain elevation near the former Smelter site and hence reduce the possibility that creek water will flow through the former Smelter site during high-flow events. The expanded floodplain area will also provide increased flood storage on the reach of PPC near the former Smelter site. While these changes will not decrease the amount of flow in PPC that needs to pass through the City of East Helena during flood events, it is expected to affect flood intensity during moderately high flow conditions.

Floodplain engineering and analysis will be completed by the Custodial Trust to verify conceptual engineering evaluations completed to date and to obtain permits. Additional information on permitting activities is outlined in Section 7 of this IM Work Plan 2012.

2.1.4.6 Natural Resources

Implementation of the SPHC IM will also benefit existing natural resources in the South Plant area as the water levels in Upper Lake Marsh, Upper Lake, and Lower Lake are dropped and the area is returned to conditions that were present before the American Smelting and Refining Company (ASARCO) actions that created these surface water features. Upper Lake, Upper Lake Marsh, and Lower Lake are all human-made features, created by ASARCO to support site operations over time. Upper Lake and Upper Lake Marsh were created by diverting PPC and Lower Lake was created in the 1940s by building a berm across the northern portion of Upper Lake so that it functioned as a process water pond.

Understanding the nature and extent of impacts to natural resources is critical to evaluating the effectiveness of the IM. Background data gathering to define baseline ecological conditions in the SPHC area began in September 2011. A wetland delineation, wildlife assessment, and stream geomorphological assessment was completed for the Custodial Trust by CH2M HILL, Pioneer Technical Services (PTS), and Morrison Maierle Inc. (MMI) in November 2011. Additionally, a baseline ecological risk assessment was completed in 2011. Documentation of these activities is provided in the following reports:

- *Wetland Delineation Data Summary Report*, PTS and MMI, January 27, 2012
- *Wildlife Resources Evaluation*, CH2M HILL, November 18, 2011
- *Existing Conditions Stream Assessment, Prickly Pear Creek, East Helena Smelter RCRA Site,* Applied Geomorphology Inc, PTS, and MMI, January 27, 2012.
- *Final Baseline Ecological Risk Assessment, Former ASARCO East Helena Facility, East Helena, Montana*, Gradient, 2011

Conceptual engineering completed to date indicates that SPHC IM construction will result in an overall increase in palustrine emergent wetland habitat. Figures 2-9, 2-10, and 2-11 display ecological conditions in the South Plant area currently, during, and post SPHC construction. Figure 2-9 shows existing conditions in the South Plant area; open water is displayed in blue and palustrine emergent wetland in orange. During construction of the PPC temporary bypass, the area of open water will be reduced by further lowering water levels in Upper Lake and by eliminating Lower Lake. Figure 2-10 shows the extent of wetland likely to be temporarily impacted. Figure 2-11 illustrates the anticipated finished condition in the South Plant area following PPC realignment and removal of the Tito Park/Lower Lake contaminant source areas. As shown, significant new areas of palustrine emergent wetland are expected to be created.

2.1.5 Conceptual Design and Construction Considerations

The SPHC IM is composed of multiple projects to be completed in sequence. The initial site preparation work is for utility relocation and decommissioning in the east tertiary bench, proposed herein for 2012 and described in further detail in subsequent sections of this IM Work Plan 2012. Conceptual design and construction considerations for the other main components of the SPHC IM are summarized in the following sections.

2.1.5.1 PPC Temporary Bypass Channel

After the utilities have been relocated or decommissioned in the east tertiary bench, east of PPC, a temporary bypass channel will be constructed in order to dewater Upper Lake, Tito Park, and Lower Lake and route PPC stream flow around planned construction areas. The bypass channel remains in place until all the backfill and wetlands construction is completed in the area where Lower Lake sediments and Tito Park soils were removed.

In addition, excavation in the bypass area will provide earth fill needed for construction of the ET cover system and proposed CAMU. Figure 2-12 provides the conceptual layout of the PPC temporary bypass.

The PPC temporary bypass is currently envisioned to begin upstream of the existing Upper Lake diversion structure, turn east into the adjacent tertiary bench, and then move northward to a termination point just downstream of Smelter Dam. The low-flow channel of the bypass will be designed to pass the 5-year flood event. The overall floodway of the bypass will provide the hydraulic capacity to pass the 25-year flood event. A contingency plan will be put into effect that provides an overflow into the existing PPC channel if spring high-flows exceed the 25-year event.

The following key design components will be developed during detailed engineering:

- Channel Excavation and Grading—Includes low-flow (5-year event) and high-flow channels (25-year event). Design to include contingency plan for management of high flow events.
- Flow Channel Hydraulics and Flow Modeling—Includes modeling of low- and high-flow conditions of the temporary bypass channel of PPC, with consideration of the ultimate PPC permanent relocation design, using

the Hydrologic Engineering Centers River Analysis System (HEC-RAS) environmental simulation modeling software.

- Conditional letter of map revision (CLOMR)—Includes the HEC-RAS analysis of the temporary bypass channel for use in the CLOMR and a floodplain permit application with the City of East Helena.
- Removal of Upper Lake diversion structure and backfilling Upper Lake diversion ditch (see Figure 2-13).
- Breaching of the Upper Lake Dam (see Figure 2-13).
- Existing Access Road Temporary Bypass Crossing.
- Flow Channel Stabilization—Design of erosion stabilization components within the low- and high-flow channels of the temporary bypass.
- Utilities Interface—Interface with design of temporary and permanent utilities relocation and utility protection components (for those that must remain in place) for the project.
- Temporary erosion and sedimentation control plans (including Stormwater Pollution Prevention Plan [SWPPP]) for work area and stockpile materials processing areas.

PPC temporary bypass construction is currently planned to begin in March 2013. PPC bypass construction is sequenced as the first SPHC project to allow for temporary diversion of the PPC around Smelter Dam, the Upper Lake diversion structure, and the PPC realignment area. Following diversion of PPC flow into the bypass, the Upper Lake diversion structure will be demolished and removed and the Upper Lake dam breached to facilitate dewatering of the South Plant area. Construction is scheduled to be completed by September 2013. Actual diversion of PPC flow into the bypass is expected to occur in mid-July 2013. It is anticipated that the bypass will be operational for approximately 1 calendar year, including one spring high-flow event.

Implementation challenges associated with constructing the bypass include large quantities of sand, gravel, and cobbles that will need to be excavated from the tertiary bench and electrical, gas, water, and possibly fiber optic utilities present along the alignment that will need to be moved or otherwise accommodated. Construction start will be coordinated with relocation of utilities currently located in the area. Excavation is expected to begin in the central portion of the project area and proceed north and south to the points where the bypass ties into PPC. The actual tie in from the bypass channel to PPC will not be completed until the required permits are obtained.

Construction is expected to involve the excavation, processing, and stockpiling of approximately 260,000 cubic yards (yd^3) of material. All of this material is planned for reuse in other IMs to be completed at the site including the ET cover system. Material stockpiles will be located on the tertiary bench located east of the site, near the construction area.

2.1.5.2 PPC Realignment

The PPC Realignment project is intended to regrade and rehabilitate about 6,000 lineal feet of creek channel along the eastern alluvial terrace adjacent to the site. This project is anticipated to be completed in 2014 after the PPC temporary bypass is constructed and Smelter Dam is demolished. It is anticipated the project will result in reduced surface water recharge from PPC to site groundwater, improved flood storage in the reaches south of existing Highway 12, preservation and expansion of wetlands, and rehabilitation of the stream channel for fish passage.

The conceptual final configuration of the realigned PPC channel is provided in Figures 2-14 and 2-15. A summary of existing conditions in this portion of PPC is provided in the following:

- *Existing Conditions Stream Assessment Prickly Pear Creek, East Helena Smelter RCRA Site,* Prepared for CH2M HILL by Applied Geomorphology Inc., PTS, and MMI, January 2012
- *East Helena Smelter RCRA Site, Final Wetlands Assessment Data Summary Report,* PTS and MMI, January 27, 2012
- *Wildlife Resources Evaluation, East Helena Smelter RCRA Site,* CH2M HILL, November 2011

Engineering design and permitting for implementation of this project will be completed in the fall of 2012. It is planned that a Joint Application for Construction Permitting will be prepared.

Conceptual engineering design components associated with the PPC temporary bypass include the following:

- Geomorphic Analysis—Channel plan form, grade, and hydraulics
- Hydrogeologic Analysis—Groundwater flow and potentiometric surface pre- and post-construction (this work will be coordinated with ongoing groundwater flow and contaminant transport modeling being completed by the Custodial Trust)
- Hydrologic Analysis—Review of relevant stream gage records, development of flow-duration curves for channel stability analysis, and low-flow conditions (typical and extreme) to aid in channel design and fish passage analysis
- Hydraulic Modeling—Update of the hydraulic model developed for the PPC temporary bypass to estimate realigned channel hydraulic capacity and stability
- Channel Stability Analysis of Existing Condition—Incipient motion analysis to determine the range of flows needed for bed mobilization and sediment continuity analysis to evaluate aggradation and degradation trends in PPC
- Design Criteria—Summary of appropriate design events (flood magnitudes), vertical and horizontal alignment, bank construction, potential wetlands areas and floodplain design, infrastructure protection, habitat, diversity, fish passage, and other items identified in consultation with various agencies and stakeholders
- Conceptual Engineering Report—Technical memorandum with discussion of topics, such as geomorphology, instream sediment chemistry, hydrology, hydraulics, channel stability, design criteria, and the conceptual design

The PPC realignment is anticipated to be constructed in the following three phases, beginning in 2014:

1. The north segment of the PPC realignment will be completed first, after which this section of channel will be connected to the PPC temporary bypass.
2. Next, the original PPC channel adjacent to the slag pile will be backfilled with earth excavated from the north section of the bypass channel, Smelter Dam will be demolished, and the south section of the PPC realignment constructed.
3. The final phase will involve suspending the diversion of PPC flow into the temporary bypass and redirecting this flow into the newly realigned PPC. Once flow is redirected into the realigned PPC channel, the PPC temporary bypass area will be graded into its final configuration.

The primary implementation challenges associated with constructing the PPC realignment include dewatering the construction area; handling large quantities of sand, gravel, and cobbles that will need to be excavated from the tertiary bench in the north section; coordinating this project with the planned excavation of contaminated soil and sediment from Tito Park and Lower Lake; and reestablishing wetlands in the South Plant area following construction. All of these issues will be addressed during the detailed design phase of the PPC realignment project.

Construction is expected to involve the excavation, processing, and stockpiling of approximately 250,000 to 300,000 yd^3 of material. All of this material is planned for reuse in other IMs to be completed at the site, including the ET cover system. Material stockpiles will be located on the tertiary bench located east of the site, near the construction area.

2.1.5.3 Removal of Smelter Dam

The purposes of this project are to remove Smelter Dam and eliminate retention of PPC flow behind and upstream of the dam, dewater the South Plant area of the site, and to enable construction of the PPC realignment

(see Figure 2-13). A secondary benefit of dam demolition is removal of the obstruction to fish passage caused by the dam.

An inspection of Smelter Dam (also known as East Entrance Dam) was completed by Hydrometrics (*East Entrance Dam Engineers Inspection Report*, March 2012). According to this report, Smelter Dam is a reinforced-concrete structure, 21 feet high and about 60 feet long, comprising three bays, each nominally 20 feet wide. The two western bays are configured as a weir overflow spillway and the eastern bay is a solid concrete wall with two 36-inch lower-level outlet gates. The bays are separated by upstream and downstream counterforts, which also serve as bridge supports. There are no known design documents for the dam's original construction.

Smelter Dam will be removed during construction of the PPC realignment. The dam will be maintained by the Custodial Trust until the PPC realignment is constructed in order to serve in a contingency role for PPC flow management should spring runoff exceed the PPC temporary bypass design criteria.

The current bridge structure over Smelter Dam is in disrepair and is not safe for vehicle passage. To provide construction vehicle access between the former Smelter site and the work areas east of PPC, the existing bridge supports through the spillway section, bridge beams, and decking on Smelter Dam will be removed and a new vehicle bridge structure installed. This work is being performed in preparation for both the ET Cover System IM and construction of the onsite CAMU. At the same time, in accordance with recommendations included in the Dam Inspection Report, riprap may be installed on the upstream and downstream faces of the spillway to increase resistance to erosion. After the dam is demolished, it is planned that the bridge structure will be moved and installed in a new haul road location (to be determined during PPC realignment detailed engineering).

Smelter Dam removal is currently scheduled to occur in 2014. Removal is expected to occur by conventional means. Electrical and other utilities on the bridge deck will be decommissioned first. Next, the bridge structure will be removed, followed by the gates and concrete structure. Foundation removal is expected to be limited to a few feet below the existing stream channel. Excavation of silts behind the dam, and sands and gravels from around the abutments will be required to expose the structure for removal.

The primary implementation challenge associated with dam removal is expected to be dewatering behind the structure. A contractor-installed dewatering system may be required to accelerate dewatering behind the dam. Discharge of water pumped from behind the dam will require, at a minimum, turbidity control.

2.1.6 Proposed 2012 Site Preparation Projects

The initial site preparation projects proposed for construction in 2012 (Figure 1-1) are a new, prefabricated bridge deck over Smelter Dam and utility relocation/decommissioning on the tertiary bench east of PPC.

The new bridge decking is needed to provide safe vehicle access between the former Smelter site and areas east of PPC. This component of the SPHC IM will also facilitate work on the ET Cover System IM by allowing soils excavated during construction of the PPC bypass channel to be transported and consolidated for use in construction of the base of the third CAMU. The prefabricated bridge decking will remain in place until Smelter Dam is removed.

Utilities existing east of PPC will need to be relocated or decommissioned in 2012 prior to construction of the PPC temporary bypass. Utilities to be relocated or decommissioned include the City of East Helena's 10-inch water main, NorthWestern Energy overhead electrical and transmission lines (with temporary service to the Smelter site), NorthWestern Energy gas line, Century Link telephone, and the Air Liquide facility.

Engineering and construction of these proposed 2012 projects is further described in Section 6.

2.2 ET Cover System Interim Measure

2.2.1 Objectives

The overall objectives of the ET Cover System IM are as follows:

- Reduce the infiltration of precipitation and associated leaching of inorganic contaminants in surface soils to groundwater, which will further reduce the volume of contaminant mass being mobilized to groundwater and transported off the Facility.
- Replace the existing temporary cover system, which is deteriorating
- Eliminate the potential for people and wildlife to have direct contact with contaminated surface soils
- Reduce the volume of contaminated stormwater that is being collected and treated by the onsite high-density sludge (HDS) system.

2.2.2 Description

The ET cover system will consist of one or more vegetated and soil layers designed to retain water until the water is either transpired through vegetation or evaporates. The cover system uses the water storage capacity of the soil layers, rather than the physical characteristics of traditional cover materials like clays, asphalt, or geotextiles to minimize percolation. This provides a more cost-effective and sustainable method of minimizing infiltration when compared to traditional engineered cover designs.

ET cover construction is expected to occur in three phases, as shown in Figures 2-16, 2-17, and 2-18. Each phase will be preceded by required demolition and soil removal actions, and result in reduced stormwater flow to the Custodial Trust's HDS water treatment plant. Phase 1 of the ET cover system will be approximately 30 acres, located over the LOSA in the northwesterly portion of the former Smelter site. The LOSA was selected as the location for the first phase of the cover system because it (1) contributes approximately 50 percent of the stormwater that is currently being collected and treated in the HDS water treatment system, (2) displays historical deposition and depths of contamination that are less than the other former process areas that have been identified as the primary source areas, and (3) has the depth to groundwater that is greater than areas toward the south end of Parcel 16.

The ET Cover System IM is conceptually planned to encompass the majority of the former Smelter site, as shown in Figure 2-19, with the exception of the footprint of the slag pile and areas necessary for ongoing access to support slag recycling operations. Phase 2 includes the southeast portion of the site (to the edge of Upper and Lower Lakes), which produces about 25 to 30 percent of stormwater flow to the HDS water treatment plant. Phase 3 includes the northern section of the site, which produces about 25 to 30 percent of stormwater flow to the HDS water treatment plant. When finished, the ET cover system will cap all former process areas at the site and enable precipitation runoff to be shed clean to offsite drainages.

2.2.3 Benefits

The ET cover system will provide numerous protective functions:

- Control moisture and infiltration into subsurface soils
- Manage surface water runoff
- Minimize water and wind erosion/transport
- Prevent direct exposure to contaminated soil
- Prevent occurrence of disease vectors and other nuisances
- Meet aesthetic and potential passive recreational end-uses

The ET cover system is also currently envisioned to function as the cover for the CAMU being constructed as part of the Source Control IM, described in Section 2.3. To meet the requirements for a CAMU cover, per the minimum design standards specified in the final CAMU Rule, the ET cover system must provide a level of impermeability at least equal to the bottom liner system.

In arid regions of the country, such as in East Helena, ET cover systems have been found to be highly effective and relatively low cost to operate and maintain over the long term. ET cover systems rely on the ability of a soil layer to store precipitation until it is naturally evaporated or is transpired by the vegetative cover. In this respect, they differ from more conventional cover designs (e.g., cover systems that use low hydraulic conductivity barrier

systems, including clay, geosynthetic clay liners, and geomembranes) in that they rely on obtaining an appropriate water storage capacity in the soil rather than shedding water as done when using an engineered low permeability system. ET cover system designs are based on using natural hydrological processes (water balance components) at a site, which include the water storage capacity of the soil, precipitation, surface runoff, ET, and infiltration. The greater the storage capacity and evapotranspirative properties are, the lower the potential for percolation through the cover system (USEPA 542-F-11-001, February 2011).

Regulatory guidance from the Montana Department of Environmental Quality (MDEQ) has required ET cover performance demonstrations and, based on the success of these systems, has led to regulations allowing ET cover installation if site owners show that soil, design, and climatic conditions are similar to those of a location with a permitted ET cover. Key design considerations include climate, soil type, soil thickness, vegetation types, soil fertility, and control layers.

ET cover systems are commonly used. USEPA has developed and recently updated a searchable online database with information about ET cover systems. This database is located at http://cluin.org/products/altcovers. As of the February 2011 update, the database contained 167 projects with full-scale monolithic ET cover systems and five projects with capillary-break ET cover systems. These systems have been proposed, tested, or installed throughout the United States at municipal solid waste (MSW), hazardous waste, industrial waste, and radioactive waste sites. Full-scale applications have primarily been in the Great Plains and western states. Where data are available, the database provides project profiles that include site background information (such as site type, climate, and hydrogeology), project information (such as purpose, scale, and status), cover information (such as design, vegetation, and installation), performance and cost information, points of contact, and references.

Table 2-1 shows landfills with approved and installed ET cover systems at MSW landfills in Montana (USEPA 542-F-11-001, February 2011). Locally, two MSW landfills have been permitted with ET covers—Butte-Silver Bow and Valley View Landfills. Valley View Landfill, located adjacent and east of the Facility, has successfully implemented a monolithic type ET cover.

TABLE 2-1
Approved and Installed ET Cover Systems at Montana Municipal Solid Waste Landfills

Location	Waste Type	Status	Type
Allied Waste of Montana, Missoula, MT	MSW	Installed	M
City of Billings, Billings, MT	MSW	Installed	M
City of Bozeman, Bozeman, MT	MSW	Installed	M
City of Butte Landfill, Butte, MT	MSW (old fill)	Installed	M
City of Butte Landfill, Butte, MT	MSW (new fill)	Approved	M
Harve Class II Landfill, Havre, MT	MSW	Proposed	M
High Plains, Great Falls, MT	MSW	Installed	M
Lake County Landfill, Polson, MT (Demo)	MSW	Complete	CB
Lake County Landfill Full Scale, Polson, MT	MSW	Approved	CB
Lewis and Clark County Landfill, Helena, MT (Demo)	MSW	Complete	CB
Mr. “M” Landfill, Lewiston, MT	MSW	Installed	M
Sanitation, Inc., Lewistown, MT	MSW	Installed	M
Unified Disposal District, Havre, MT	MSW	Proposed	M
Valley County Landfill, Glasgow, MT	MSW	Proposed	M
Valley View, East Helena, MT	MSW	Installed	M

CB = capillary break
M = membrane
MSW = municipal solid waste.

Additionally, USEPA has evaluated ET cover system performance in Montana at sites in Polson and Helena (USEPA 542-F-11-001, February 2011). Data from these sites are summarized in Table 2-2. Each site was evaluated over a 4-year period using the Alternative Cover Assessment Program (ACAP) water balance method. In Polson, Montana, the ET cover system performed better than the comparative membrane composite system. In Helena, the ET cover system showed no drainage at all. These data demonstrate that an ET cover system at the former Smelter site can achieve required performance criteria.

TABLE 2-2
Alternative Cover Assessment Program Water Balance Results

				Drainage	
Site Location	**Cover Design**	**Data Years (Days)**	**Precipitation (mm)**	**mm**	**As % of Precipitation**
Polson, MT	ET with Capillary Break	7/1/00 to 6/30/01 (365)	358	0.18	0.05%
		7/1/01 to 6/30/02 (365)	308	0.39	0.13%
		7/1/02 to 6/30/03 (365)	326	0.19	0.06%
		7/1/03 to 6/30/04 (365)	254	0.2	0.08%
		Annual Average		0.2	0.08%
	Membrane Composite	7/1/00 to 6/30/01 (365)	358	1.16	0.32%
		7/1/01 to 6/30/02 (365)	308	0.0	0.0%
		7/1/02 to 6/30/03 (365)	326	0.0	0.0%
		7/1/03 to 6/30/04 (365)	254	0.5	0.2%
		Annual Average		0.42	0.13%
Helena, MT	ET with Capillary Break	7/1/00 to 6/30/01 (365)	252	0.0	0.0%
		7/1/01 to 6/30/02 (365)	314	0.0	0.0%
		7/1/02 to 6/30/03 (365)	288	0.0	
		7/1/03 to 6/30/04 (365)	103	0.0	
		Annual Average		0.0	0.0%

2.2.4 Conceptual Design and Construction Considerations

The conceptual design for the cover system layers is as follows, from top to bottom:

- **Vegetated Layer** (8 inches) – Select fill with a minimum percentage of organic material to support vegetation in the layer, sloped not less than 3 percent at the top of the cover and 5 percent at the cover side slopes and vegetated. Select fill" refers to material that will be screened from onsite excavation material, or brought in from nearby sources that is used to fill in or build up to a predetermined layer thickness, in this case 8 inches. This material is anticipated to be a silty sand with gravel, amended with organics to support a robust native vegetation (i.e., native grasses) cover.
- **ET Layer** (16, 24, or 32 inches) – Select fill, initial thickness proposed as 16 inches, with a sensitivity analysis at 24 and 32 inches. "Select fill" here refers to material that will be screened from onsite excavation soils, or brought in from nearby sources that is used to fill in or build up to a predetermined layer thickness. For the ET Layer, the thickness will be established based on performance modeling and soil testing. The range of thicknesses being modeled is 16, 24, or 32 inches. This material is anticipated to be a silty sand with gravel, with a maximum particle size of approximately 1 to 3 inches.
- **Capillary Break Layer** (6 inches) – Allows for capillary break, provides filter between select fill and bio-barrier (cobble) layer, and working layer for on top of biobarrier material. An increase in pore size, with the layer having a hydraulic conductivity not less than of 1×10^{-2} centimeters (cm) per second.

- **Biobarrier Layer** (6 inches) – Cobble-sized and greater screenings to provide resistance to animal burrows and disturbance of underlying material.

As part of the design development for the ET Cover System IM, cover effectiveness modeling will be performed on the prototype cover section. The following analyses will be included:

- ET cover effectiveness modeling of the proposed cross-section using a two-dimensional, simplified unsaturated flow model with site-specific hydrologic and ET interface (such as HYDRUS 2D)
- Erosion calculations to determine surface soil thickness and armoring requirements
- Vegetation development requirements in terms of native species, root depth, and soil preparation/planting requirements
- Borrow material requirements for proposed cover section components

The following additional design activities are anticipated:

- Geotechnical Analysis – Includes review of geotechnical data in the area of construction, development of design criteria for grading and earthen materials needed for construction of the cover system, stability analysis, and estimation of earthen material balance
- Site Civil Engineering and Grading – Includes creating computerized three-dimensional grading models that show cover system layout, fills, ditches, roads, and other design components (this includes estimation of material volumes and creation of sections and profiles)
- Stormwater Management – Includes analysis of stormwater run-on/runoff, development of minimum requirements for temporary stormwater and erosion control measures, and design of permanent stormwater management structures and measures

It is expected that construction of the Phases 2 and 3 cover systems will require backfilling in the lowest areas to achieve the site grades needed to promote surface water runoff and appropriate drainage patterns. The use of fumed slag is currently being evaluated as potential onsite backfill beneath the cover system. Considerations for use of slag as a backfill will include the leachability of constituents that may be present in the slag, the geotechnical properties of the slag, ease of loading and transport to the point of use, and availability of alternative backfill sources.

The Phases 2 and 3 cover systems will also need to provide both truck and rail access to the slag pile so that ongoing metals recovery operations can continue unimpeded. It is currently envisioned that access for Montana Rail Link will be on the north side of the Phase 3 cover system (near the former zinc plant and that truck access will be through the southwestern part of the site gate near the existing former acid tanks [where slag is currently loaded to rail cars for transport to metals recovery]).

ET cover construction will require importing an estimated 600,000 yd^3 of earthen material from offsite sources. Earthen materials needed to build the Phase 1 ET cover system are planned to be obtained from the PPC temporary bypass construction, East Field Repository, and other sources east of the site. This fill material will be processed onsite and hauled across Smelter Dam on the new bridge structure. It is anticipated that most of the materials required for construction of the Phases 2 and 3 ET cover systems can be obtained either from the Valley View Landfill stockpile or from other onsite excavations (such as from the PPC permanent realignment north of Smelter Dam).

Implementation challenges associated with constructing the ET cover system include stockpiling, processing, hauling, transporting, and placing the large quantities of sand, gravel, and cobbles that will be needed for construction; coordinating with demolition activities such that each phase of construction can be completed within the limited Montana construction season; managing stormwater runoff collection and treatment during construction, erosion control; and coordinating operation of the existing HDS water treatment plant (or sequencing its replacement with a temporary package treatment plant to allow demolition of the existing system).

2.2.5 Proposed 2012 Site Preparation Projects

The initial site preparation component of the ET Cover System IM proposed for construction in 2012 is the demolition of buildings and utilities in the general LOSA area, as shown on Figures 1-1 and 2-20 (Existing Plant Structures, and Abandoned and Active Utilities). The 2012 demolition is proposed to remove three buildings (the Ore Storage and Handling Building [OSHB] and the two "Barnum and Bailey" buildings) in the LOSA. The OSHB was used in the past by ASARCO for storage and blending of feedstock used in the smelting process. The building is a large, precast concrete structure with extensive concrete foundations; it was decontaminated by ASARCO in 2009. The building is currently vacant except for an overhead bridge crane and miscellaneous other pieces of equipment. The Barnum and Bailey buildings are steel-framed structures with synthetic fabric exteriors. Framing steel in each building is attached at the perimeter to concrete foundations. Site preparation activities (e.g., surface preparation, temporary stormwater management) will be implemented to ensure that conditions in the demolition areas remain protective.

The other component of the ET Cover System IM proposed for 2012 is decommissioning of various utilities associated with former operations in the LOSA. Utilities in other areas of the former Smelter site will be addressed as part of the second phase of demolition. Decisions regarding utility decommissioning will be made during final engineering design and could include removal of rail spurs and ballast, electrical and natural gas, and stormwater systems.

This work is described further in Section 5.

2.3 Source Removal Interim Measure

2.3.1 Objective

The primary objective of the Source Removal IM is to conduct selected, localized excavation of areas with the highest concentrations of inorganic contaminants in soils, and to construct a third CAMU to manage CAMU-eligible remediation waste.

2.3.2 Description

As shown in Figure 2-21, the primary components of this IM are as follows:

- Construction of a third CAMU in the LOSA
- Excavation of soils in Tito Park and the Lower Lake sediments; these soils and sediments will be placed in the third CAMU
- Installation of a low-permeability fill layer on the north edge of the Tito Park/Lower Lake excavation area
- Evaluation of additional removal actions on the former Smelter site
- Closure of the CAMU after removal actions have been completed

2.3.3 Benefits

The benefit of the Source Removal IM is to eliminate the potential for groundwater and human and ecological receptors to contact Tito Park and Lower Lake contaminated soils and sediments.

Removal of the sediments in Lower Lake is being done to implement a selected remedy for Lower Lake as identified under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process and described in *Record of Decision for Operable Unit (OU) 1 (Process Ponds)*, November 22, 1989" (OU1 ROD, USEPA/ROD/R08-90/027, 1990). The selected remedy was partially completed under CERCLA, and will be finalized under RCRA jurisdiction.

2.3.4 Conceptual Design and Construction Considerations

The primary technical considerations for this IM are the design of the CAMU and determining the extent of soil excavation and sediment removal. The CAMU will be designed with sufficient capacity to manage the CAMU-

eligible waste estimated to be associated with implementation of both interim and final corrective measures at the East Helena Facility. The liner and cover will be designed to meet all applicable regulatory requirements, including those specified in USEPA's January 22, 2002, Amendments to the Corrective Action Management Unit Rule; Final Rule (Final CAMU Rule). Additional design requirements and performance and monitoring objectives are currently being developed and will be presented in a future submittal.

Conceptual removal plans for Tito Park envision the excavation to a depth of approximately 20 feet, with the horizontal extent as shown in Figure 2-22. For Lower Lake, the OU1 ROD originally identified the need to remove sediments based on sampling data available at that time. Given the date of the ROD (1989), additional preremoval sampling is being considered as part of the design work to refine removal boundaries. Current volume estimates for the combined removal actions are approximately 255,000 yd^3.

One of the most significant challenges associated with the removal of both the soils in Tito Park and Lower Lake sediments is being able to remove, handle, and transport materials that are wet. It is expected that the diversion of PPC and the subsequent drop in water levels in Upper and Lower Lakes will passively dewater both areas. However, residual water is expected to be present, so removal and transport methods will consider the safe handling of these wet materials.

After excavation, a vertical barrier of low-permeability fill will be placed along the north edge of the excavation area in order to inhibit future recharge to the groundwater from areas to the south of the site. Additional backfill will be placed to the south of the low-permeability barrier and the areas will be partially backfilled and regraded. The upper layers of material will be selected to be compatible with the long-term plan to establish wetlands over this entire area.

As part of the development of the Source Removal IM and in conjunction with studies to be done as part of the CMS, the removal of soils from other areas at the site known to have high concentrations of inorganic contaminants in soils (such as the former Acid Plant) will be evaluated. The evaluations will consider information being developed as part of the CMS, such as conceptual site models of the former Smelter site, as well as data from the Lower Lake Drawdown Testing being done in 2012.

Once all removal actions have been completed, the third CAMU will be closed. The current closure concept for the CAMU includes placing an ET cover over the CAMU and integrating it with the overall site ET Cover System.

Additional information on the Source Removal IM will be provided in future work plan submittals.

2.3.5 Proposed 2012 Construction Projects

The initial site preparation component of the Source Removal IM proposed for construction in 2012 is the demolition of buildings and utilities in the general LOSA area, as shown in Figure 1-1. This work will prepare the LOSA for construction of the third CAMU. The building and infrastructure demolition project, described in Section 2.2.2 as the first component of the ET Cover System IM, is also the first component of the Source Removal IM. Additional information on this project is presented in Section 5 of this IM Work Plan 2012.

2.4 Interdependency of Interim Measures

Although the three IMs conceptually proposed herein are each distinct corrective actions, their functions are interdependent and complementary, and their implementation is being planned to achieve efficiencies during construction. As noted previously, the SPHC IM will reduce groundwater elevations at the south end of the plant by minimizing the recharge from surface water bodies. The ET Cover System IM will minimize infiltration, which will further reduce recharge and contaminant leaching to groundwater, and the Source Removal IM will reduce the volume of contaminated soils that have the potential to leach inorganic contaminants to groundwater. Efficiencies likely to be realized during IM construction include the following:

- Using material excavated during the construction of the PPC temporary bypass and realignment as fill for construction of the ET cover

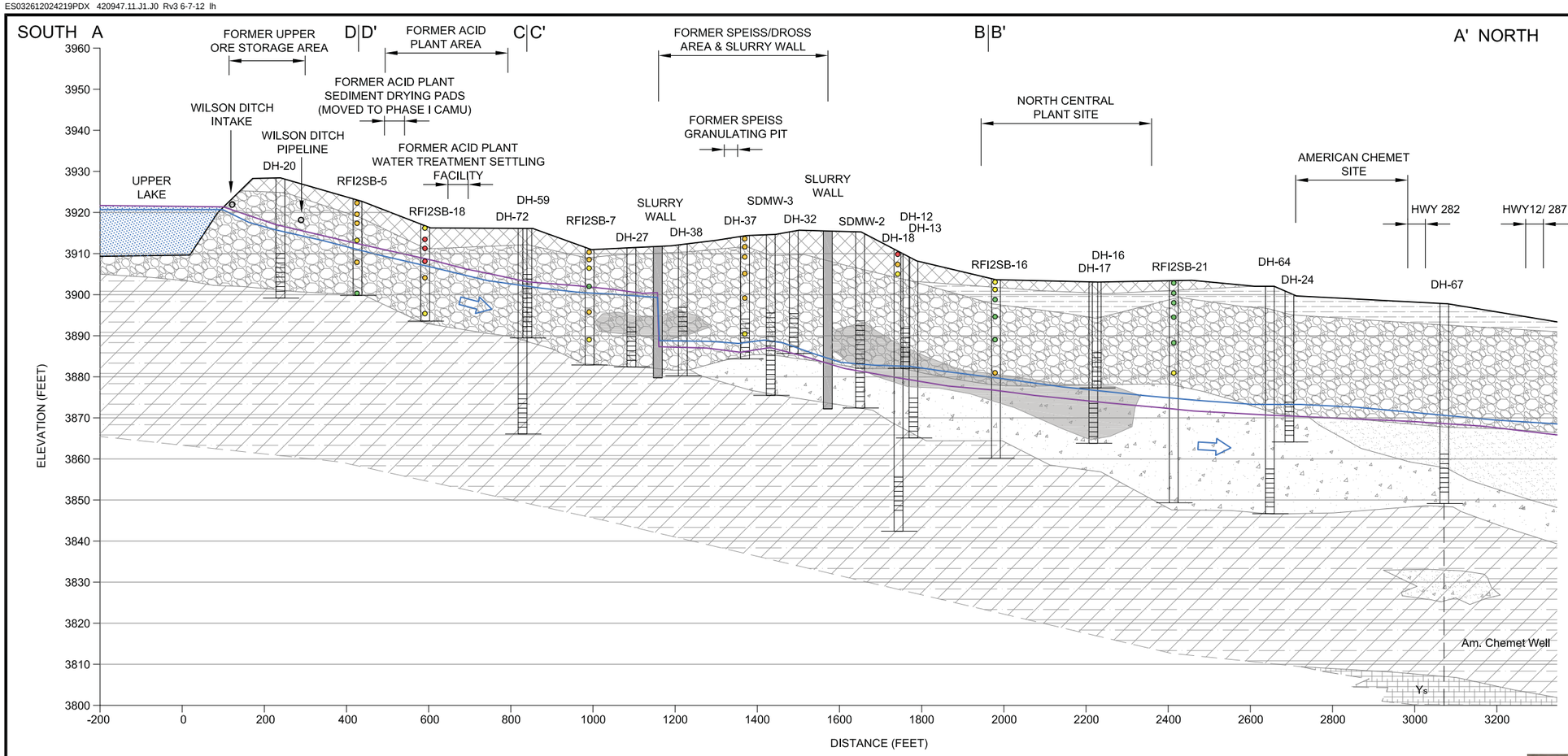
- Locating the CAMU in the LOSA such that the bottom liner system will cap existing contaminated surface soil and the final CAMU cover will be part of the overall ET cover system

The sequencing of the three IMs and their interdependent connection is represented on the conceptual schedule in Section 8, Figure 8-2.

N

Not to Scale

FIGURE 2-1
Conceptual Layout and Phasing of South Plant Hydraulic Control IM
Interim Measures Work Plan–2012 Draft
East Helena, Montana



LEGEND

- SMELTER MATERIALS
  - SLAG
  - FILL
  - HYDROCARBON STAINED SOILS
- HOLOCENE
  - HOLOCENE SILT
  - HOLOCENE ORGANIC SILT (MARSH/WETLAND SEDIMENTS)
- QUARTERNARY
  - QUARTERNARY SAND & GRAVEL
  - QUARTERNARY/TERTIARY SAND
  - QUARTERNARY/TERTIARY SILTY SAND & GRAVEL
- TERTIARY
  - UNDIFFERENTIATED TERTIARY SILT, SILTY SAND & SILTY GRAVEL
  - TERTIARY VOLCANICLASTIC SEDIMENT UNIT (WEATHERED AND/OR REWORKED ASH TUFFACEOUS SEDIMENTARY DEPOSITS)
  - TERTIARY INTERLAYERED F. SAND & VOLCANICLASTIC SILT/CLAY
  - TERTIARY SAND & GRAVEL
  - Ys "BURNT SHALE" (AS DESCRIBED IN DRILLERS LOG, INDURATED CLAY OR ARGILLITE OR THE SPOKANE FORMATION)
- JUNE 2010 STATIC WATER LEVEL
- OCTOBER 2010 STATIC WATER LEVEL
- MONITORING WELL
- SCREENED INTERVAL WELL
- COMPLETION DEPTH
- DRILLING DEPTH
- DIRECTION OF GROUNDWATER FLOW
- GEOLOGIC CONTACT (DASHED WHERE INFERRED)

NOTE: DEPTHS, HEIGHTS, DIMENSIONS OF INFRASTRUCTURE ARE APPROXIMATE ONLY.

GEOLOGIC CROSS SECTION A-A'

REFERENCE: Hydrometrics, 2011, unpublished work

150 75 0 150 300
HORIZ. SCALE IN FEET

15 7.5 0 15 30
VERT. SCALE IN FEET

ARSENIC CONCENTRATIONS (mg/kg)

Phase II RFI Report, 2011

- >2,900
- >290 - 2,900
- >29 - 290
- >2.9 - 29
- >0.29 - 2.9
- >0.29

Note:
1. Concentrations may be shown offset from wells if location believed to be soil boring or precise location not confirmed.
2. Plotted locations are average depth of soil composite sample interval.

SOURCE: DJ&A, 2011

LOCATION MAP

MORRISON MAIERLE, INC.
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Phone: (406) 442-3050
Fax: (406) 442-7862

R:\2557\006\ACAD\Exhibits\SECTION A-A'.dwg Plotted by jerry chambers on Nov/11/2011

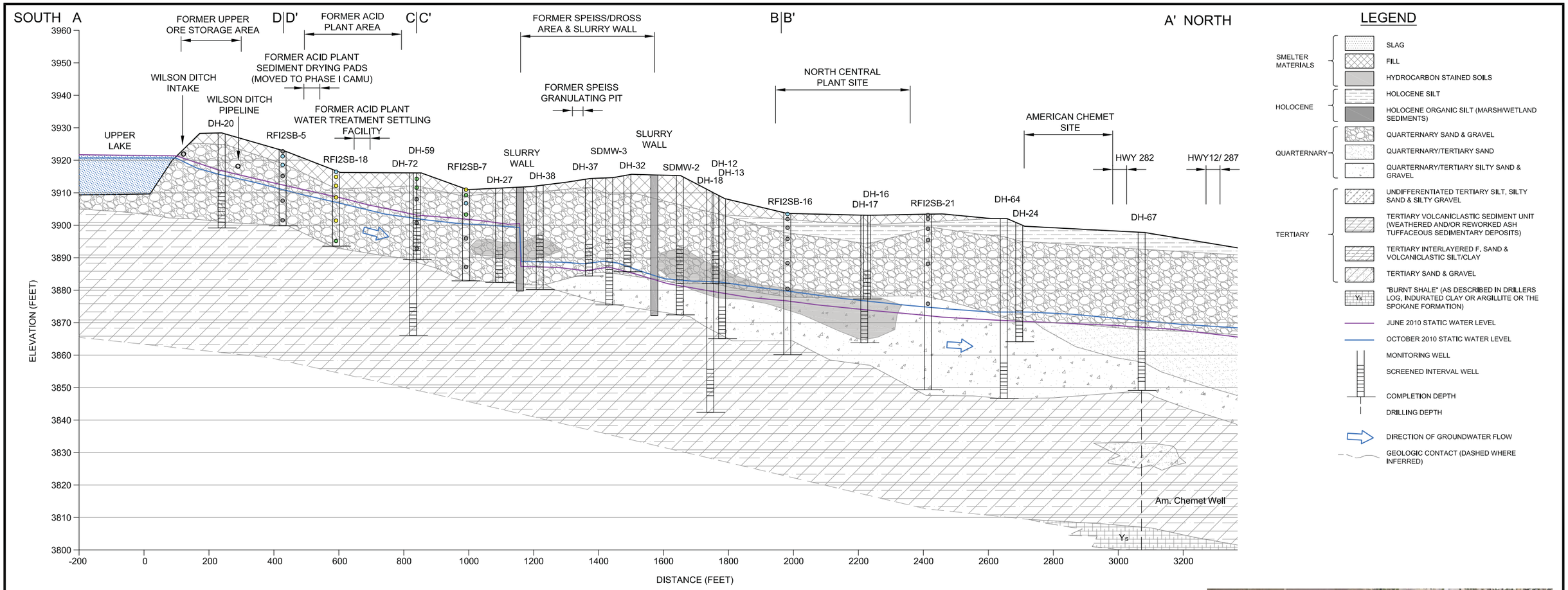
DRAWN BY: JMH
CHK'D. BY: MB
APPR. BY: MB
DATE: 11/2011

Section A-A' Vertical Profiles Arsenic Soil Concentrations

Interim Measures Work Plan–2012 Draft
East Helena, Montana

PROJECT NO. 2557.006

FIGURE NUMBER
FIGURE 2-2



LEGEND

- SMELTER MATERIALS
  - SLAG
  - FILL
  - HYDROCARBON STAINED SOILS
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  - HOLOCENE SILT
  - HOLOCENE ORGANIC SILT (MARSH/WETLAND SEDIMENTS)
- QUARTERNARY
  - QUARTERNARY SAND & GRAVEL
  - QUARTERNARY/TERTIARY SAND
  - QUARTERNARY/TERTIARY SILTY SAND & GRAVEL
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  - TERTIARY VOLCANICLASTIC SEDIMENT UNIT (WEATHERED AND/OR REWORKED ASH TUFFACEOUS SEDIMENTARY DEPOSITS)
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  - TERTIARY SAND & GRAVEL
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- JUNE 2010 STATIC WATER LEVEL
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- MONITORING WELL
- SCREENED INTERVAL WELL
- COMPLETION DEPTH
- DRILLING DEPTH
- DIRECTION OF GROUNDWATER FLOW
- GEOLOGIC CONTACT (DASHED WHERE INFERRED)

NOTE: DEPTHS, HEIGHTS, DIMENSIONS OF INFRASTRUCTURE ARE APPROXIMATE ONLY.

GEOLOGIC CROSS SECTION A-A'

REFERENCE: Hydrometrics, 2011, unpublished work

150 75 0 150 300
HORIZ. SCALE IN FEET

15 7.5 0 15 30
VERT. SCALE IN FEET

SELENIUM CONCENTRATIONS (mg/kg)

Phase II RFI Report, 2011

- >2,600
- >260 - 2,600
- >26- 260
- >2.6 - 26
- >0.26 - 2.6
- >0.26
- NOT DETECTED

Note:
1. Concentrations may be shown offset from wells if location believed to be soil boring or precise location not confirmed.
2. Plotted locations are average depth of soil composite sample interval.

SOURCE: DJ&A, 2011

LOCATION MAP

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CHK'D. BY: MB
APPR. BY: MB
DATE: 11/2011

R:\2557\006\ACAD\Exhibits\SECTION A-A'-SELENIUM.dwg Plotted by jerry chambers on Nov/11/2011

Section A-A' Vertical Profiles Selenium Soil Concentrations

Interim Measures Work Plan–2012 Draft
East Helena, Montana

PROJECT NO.
2557.006

FIGURE NUMBER
FIGURE 2-3

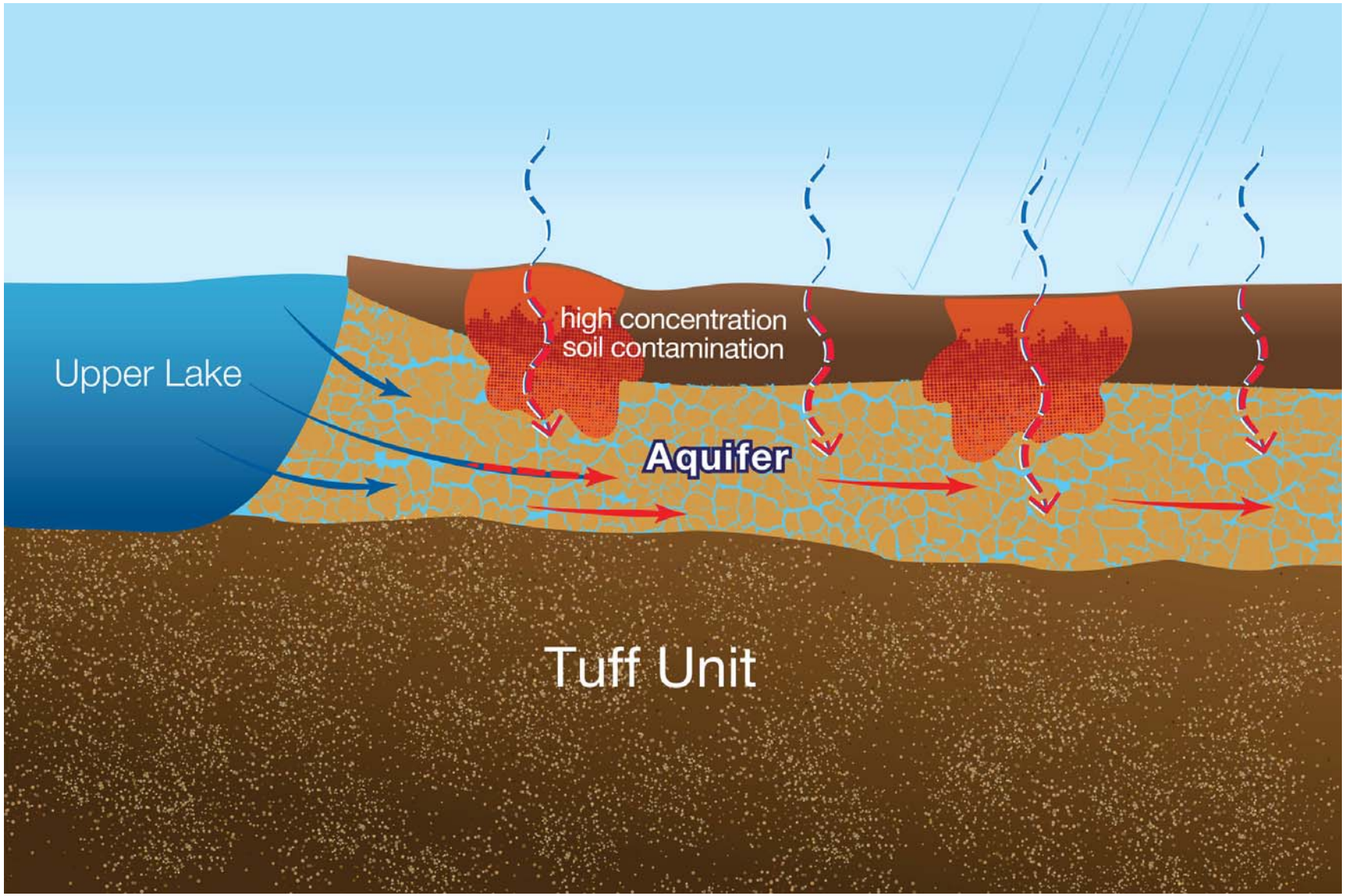


FIGURE 2-4
Conceptual Cross-sections: Current Site Conditions, Before Implementation of Interim Measures
Interim Measures Work Plan–2012 Draft
East Helena, Montana

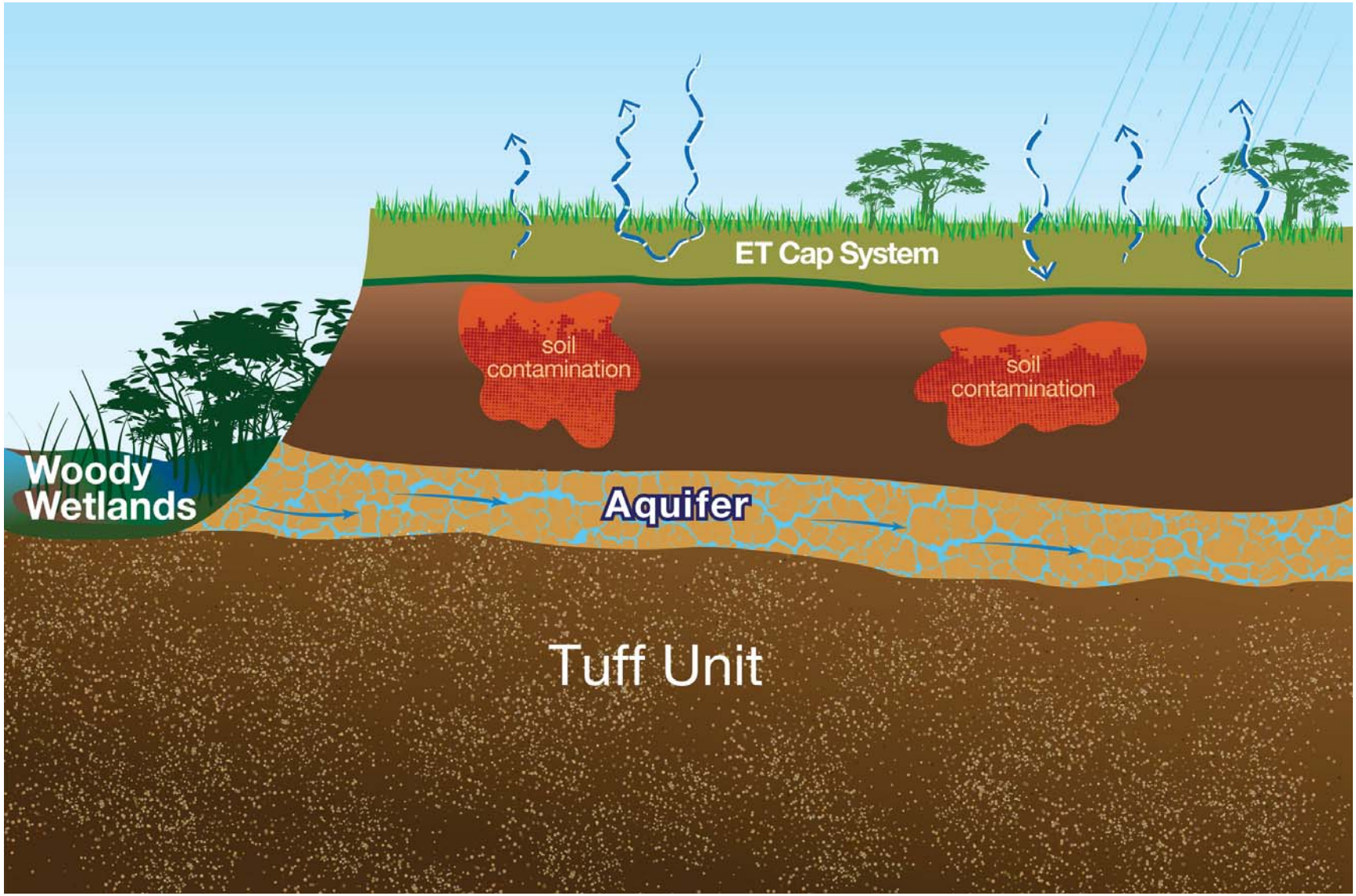


FIGURE 2-5
Conceptual Cross-sections: Proposed Site Conditions, After Implementation of Interim Measures
Interim Measures Work Plan–2012 Draft
East Helena, Montana

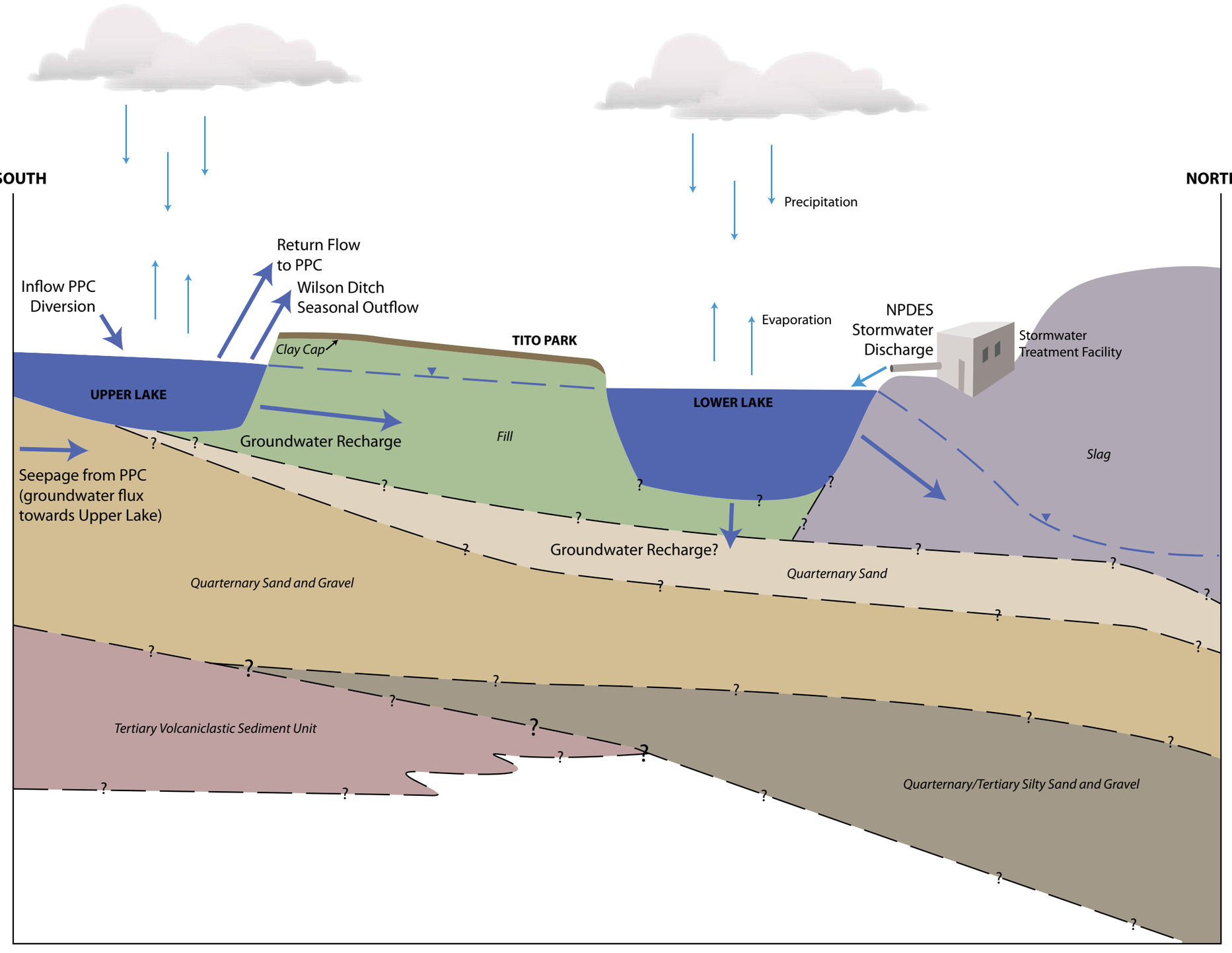


FIGURE 2-6
Conceptual Geologic Cross-Section
Existing Conditions at South Plant Area
Interim Measures Work Plan–2012 Draft
East Helena, Montana

LEGEND

- Fill
- Slag
- Quarternary Sand
- Quarternary Sand and Gravel
- Tertiary Volcaniclastic Sediment Unit
- Quarternary/Tertiary Silty Sand and Gravel

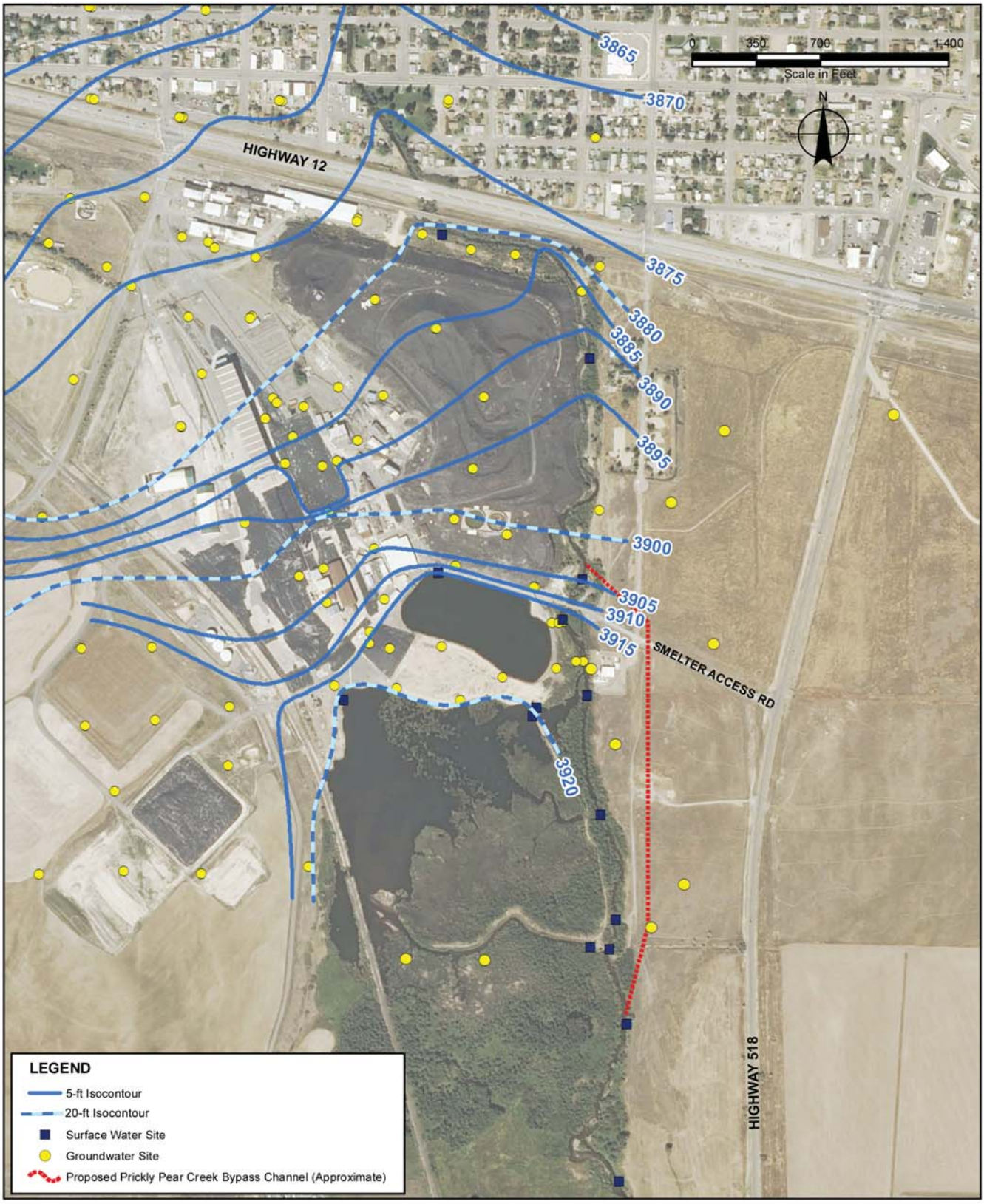
NOTE
PPC - Prickly Pear Creek

NOT TO SCALE

Modified from Hydrometrics, 2011 (unpublished see Figure 5-6e, Phase II RFI Report METG, 2011)

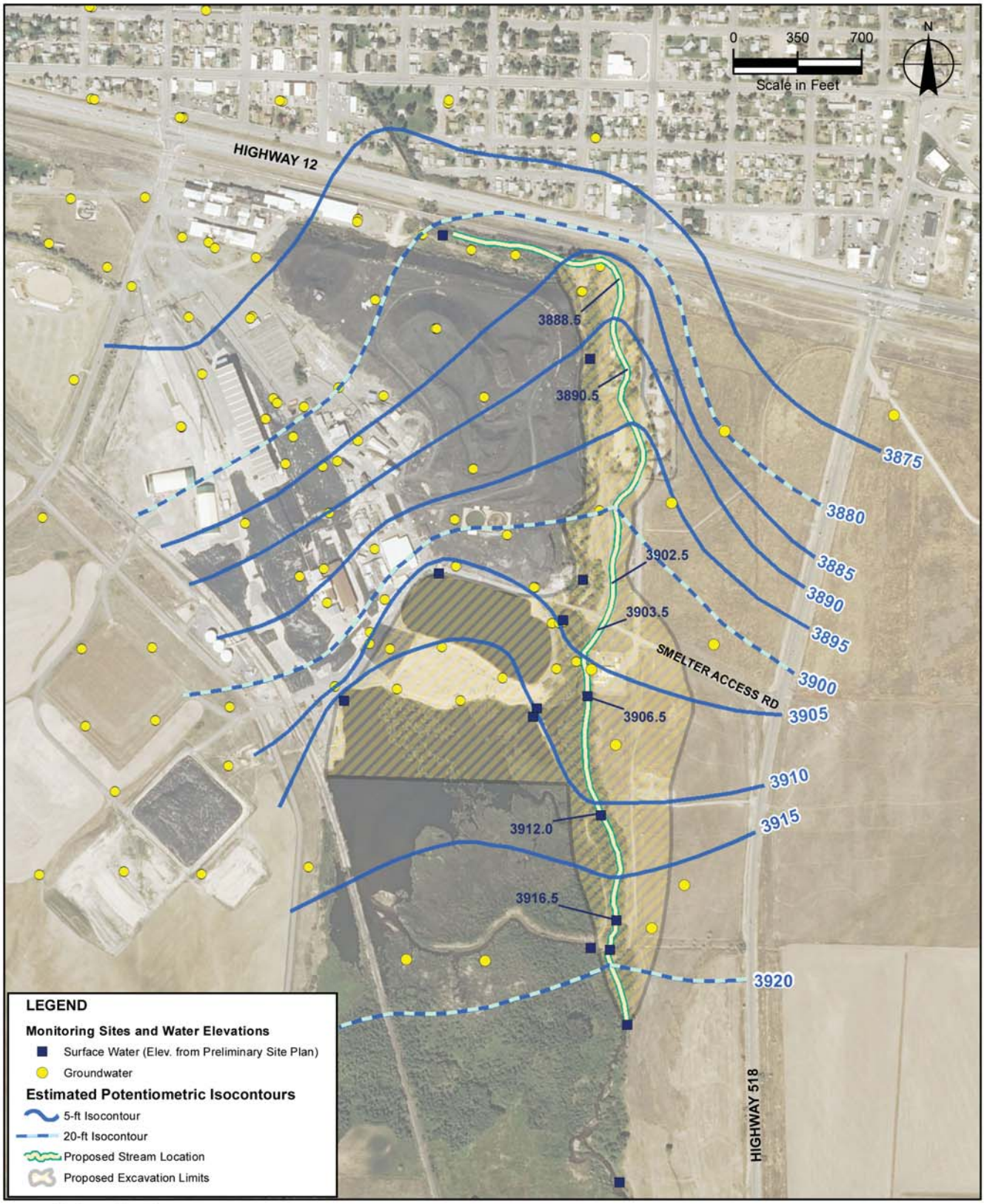
GSI Water Solutions, Inc.

P:\Portland\394-MT_Environmental_Trust_Group\002_MT_Environ_Asarco\Figures



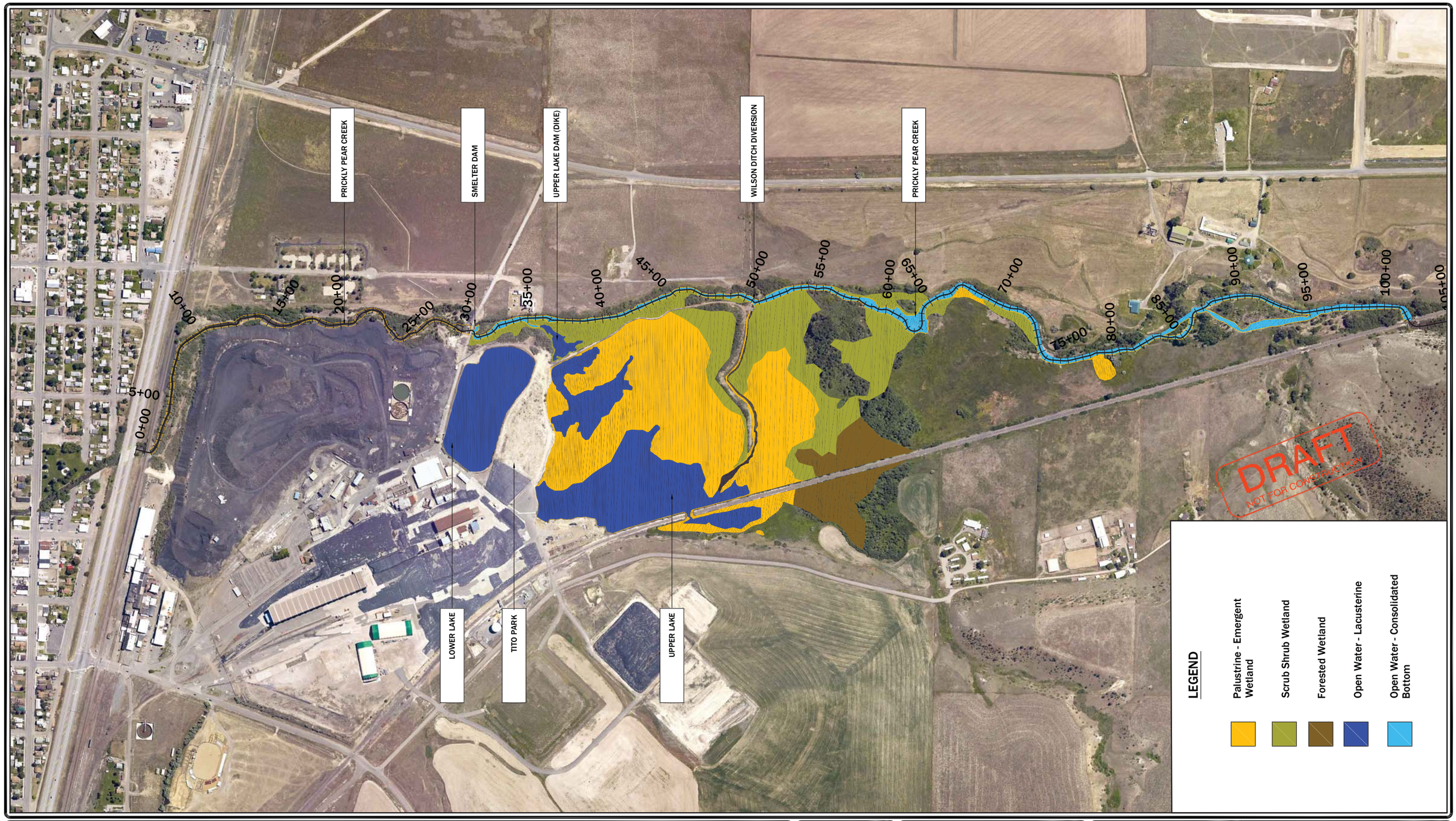
Note: Based on 2011 data.

FIGURE 2-7
Potentiometric Map
Interim Measures Work Plan–2012 Draft
East Helena, Montana



Note: Based on 2011 data.

FIGURE 2-8
Estimated Potentiometric Surface Post-PPC Reclation/Tito Park Removal and Regrading
Interim Measures Work Plan–2012 Draft
East Helena, Montana



DISPLAYED AS:
COORD SYS/ZONE: MSP
DATUM: NAD 83
UNITS: INT. FEET
SOURCE: DJA

SCALE IN FEET
0 300 600

FIGURE 2-9

Existing Conditions
East Helena RCRA Site
Interim Measures Work Plan–2012 Draft
East Helena, Montana

PIONEER TECHNICAL SERVICES, INC.
63-1/2 WEST BROADWAY
BUTTE, MONTANA 59701
(406) 782-5177

REMOVE SMELTER DAM

BREACH DAM
(DIKE TO BE REMOVED AT LATER DATE)

BYPASS CHANNEL
(MOVE PPC FLOWS AROUND WORK AREA)

~10 ACRES OF RIPARIAN CORRIDOR / WETLAND
TEMPORARILY IMPACTED WITH BYPASS TBD

POTENTIAL AREA OF
WETLAND TEMPORALLY IMPACTED
TBD

REMOVE WILSON DITCH
DIVERSION DAM

OPEN WATER AREAS EXPECTED
TO EXHIBIT PALUSTRINE-EMERGENT
WETLAND CHARACTERISTICS

FILL DITCH WITH
EXISTING FILL

0+00 5+00 10+00 15+00 20+00 25+00 30+00 35+00 40+00 45+00 50+00 55+00 60+00 65+00 70+00 75+00 80+00 85+00 90+00 95+00 100+00 105+00

DRAFT
NOT FOR CONSTRUCTION

LEGEND

- Palustrine - Emergent Wetland
- Scrub Shrub Wetland
- Forested Wetland
- Open Water - Lacusterine
- Open Water - Consolidated Bottom

GENERAL NOTES

1. STREAM CHANNEL ALIGNMENTS AND DISTURBANCE AREAS SHOWN ARE FOR CONCEPT PLANNING AND VISUALIZATION ONLY. FINAL DESIGN WILL DIFFER SIGNIFICANTLY FROM WHAT IS SHOWN ON THESE PLANS.

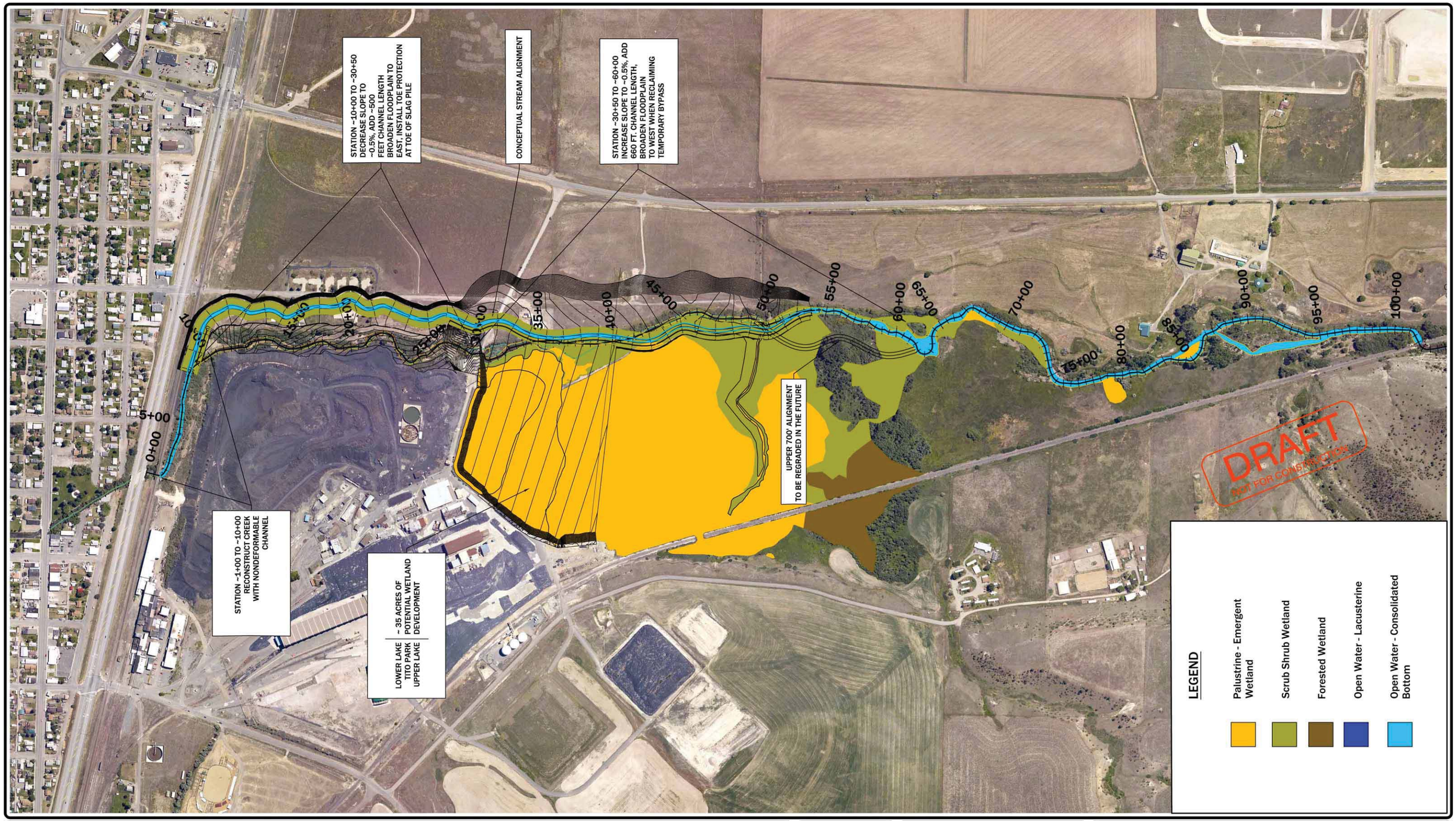
DISPLAYED AS:
COORD SYS/ZONE: MSP
DATUM: NAD 83
UNITS: INT. FEET
SOURCE: DJA

SCALE IN FEET
0 300 600

FIGURE 2-10

Conceptual Plan PPC Bypass Channel Temporary Conditions
Interim Measures Work Plan–2012 Draft
East Helena, Montana

PIONEER TECHNICAL SERVICES, INC.
63-1/2 WEST BROADWAY
BUTTE, MONTANA 59701
(406) 782-5177



DISPLAYED AS:
COORD SYS/ZONE: MSP
DATUM: NAD 83
UNITS: INT. FEET
SOURCE:

SCALE IN FEET
0 300 600

FIGURE 2-11

PIONEER TECHNICAL SERVICES, INC.
63-1/2 WEST BROADWAY
BUTTE, MONTANA 59701
(406) 782-5177

Conceptual Plan Lower and Upper Lake Grading Plan Prickly Pear Creek Final Realignment
Interim Measures Work Plan– 2012 Draft
East Helena, Montana

LAYOUT CONTROL MONUMENTS

PT	NORTHING	EASTING	ELEVATION	DESCRIPTION
73	855,849.20	1,362,382.38	3956.63	FND CONC
74	855,789.20	1,362,373.39	3957.14	FND CONC
75	855,370.76	1,362,378.37	3963.14	FND ⅝ REBAR
113	856,438.11	1,360,622.16	3936.61	RR CENTERLINE
120	861,287.54	1,361,892.86	3900.18	RR CENTERLINE
354	858,981.56	1,362,515.45	3923.47	FND ¾ REBAR
356	858,704.20	1,362,562.30	3926.23	FND RW
357	857,476.63	1,362,351.92	3939.01	FND RW
358	857,478.60	1,362,452.39	3938.25	FND RW
1128	858,187.97	1,360,152.44	3929.06	RR CENTERLINE

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Prickly Pear Creek Initial Diversions

FIGURE 2-12

Civil Plan Temporary Diversion

Interim Measures Work Plan–2012 Draft

East Helena, Montana

NO.	DATE	REVISION	BY	APVD

DSGN	DR	CHK	APVD
PJ KRYCH	CR COSBY	JG DEHNER	SW DETHLOFF

DATE JUNE 2012
PROJ 420947
DWG C-1
SHEET 5 of XX

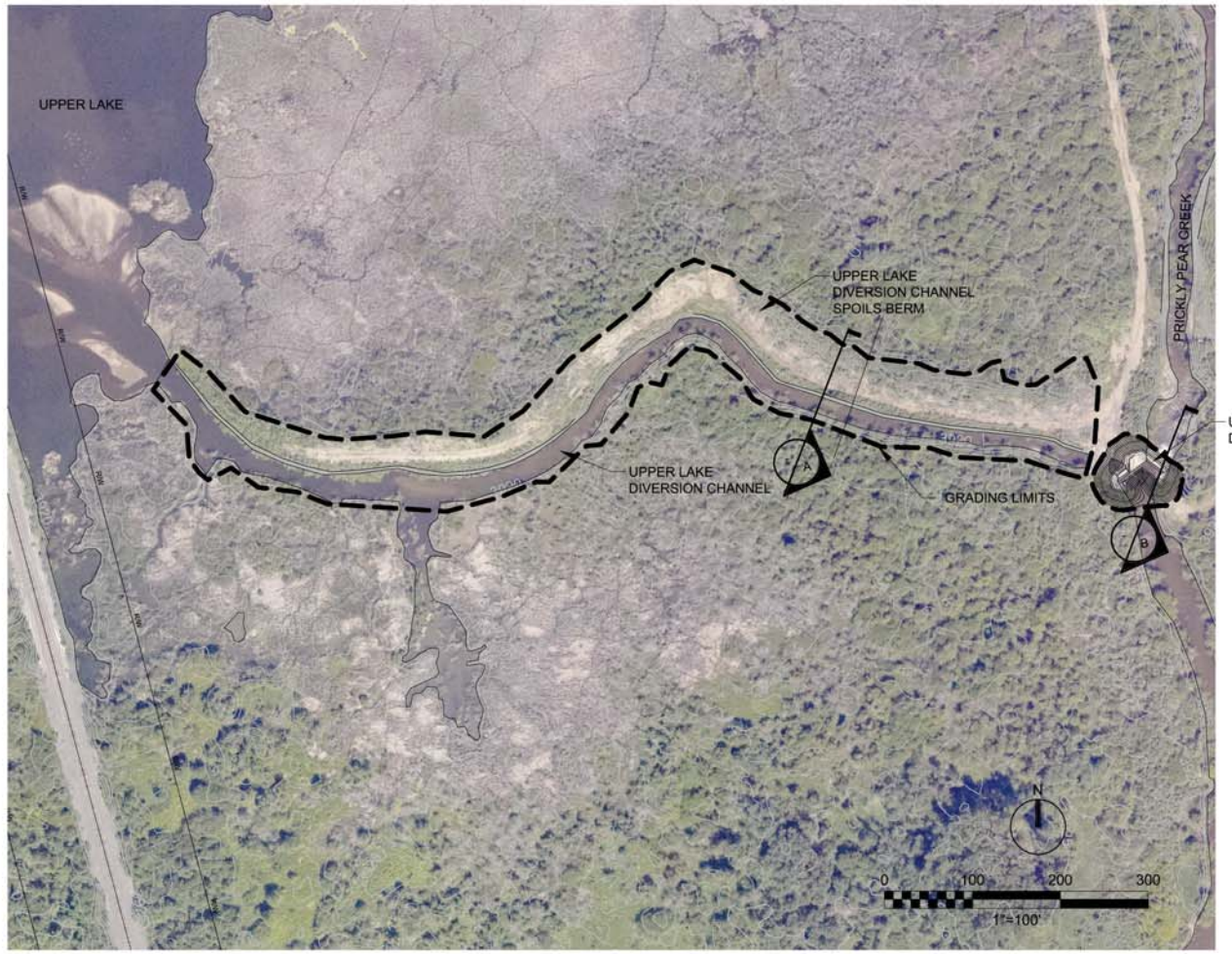
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

VERIFY SCALE

1"=200'

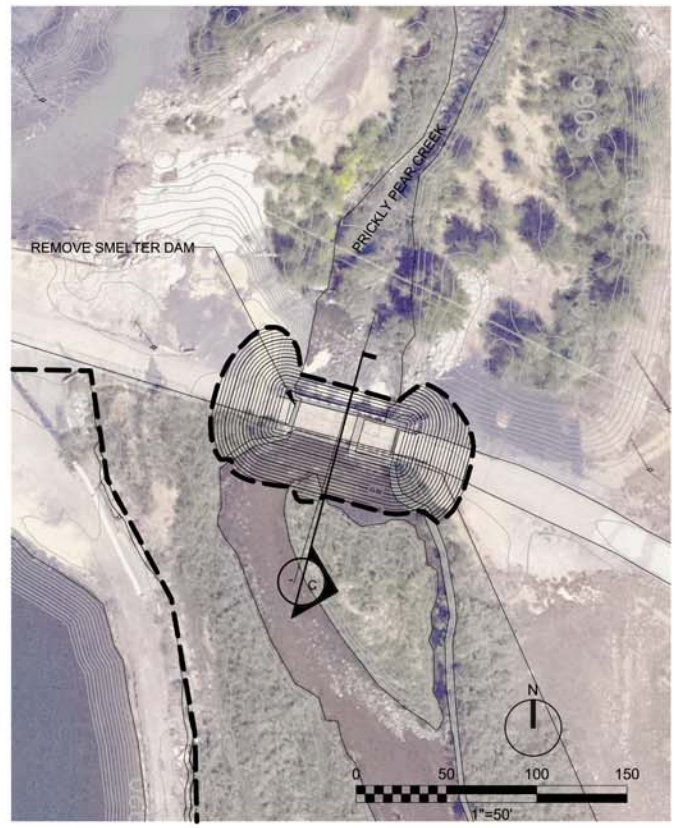
FILENAME: 14C001d.dwg PLOT DATE: 8-Jun-12 PLOT TIME: 4:06 PM

30% DOCUMENT



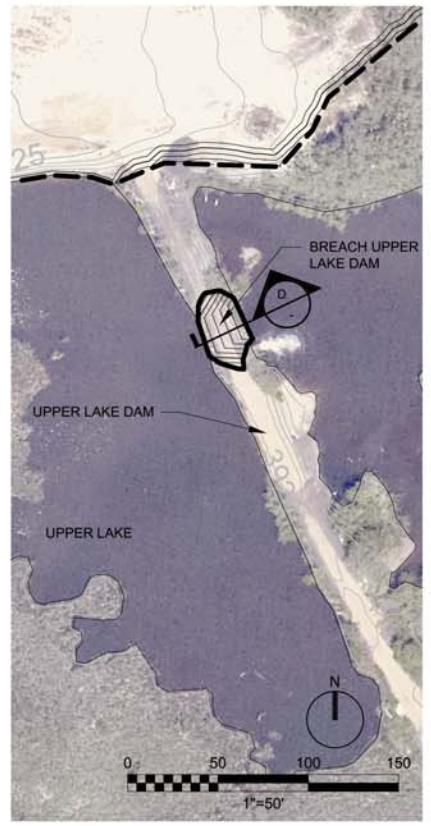
DIVERSION STRUCTURE EXCAVATION AND CHANNEL BACKFILL PLAN

1"=100'



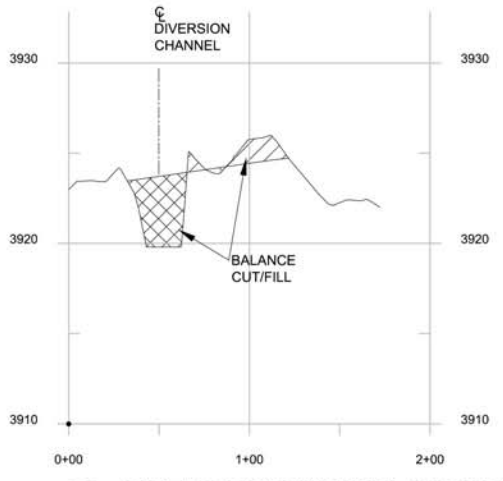
SMELTER DAM EXCAVATION PLAN

1"=100'



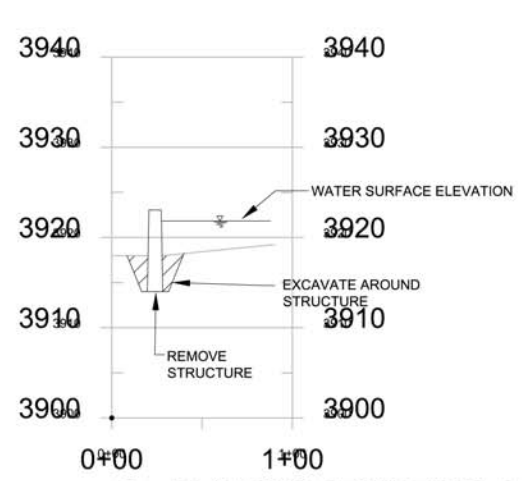
UPPER LAKE DAM PLAN

1"=100'



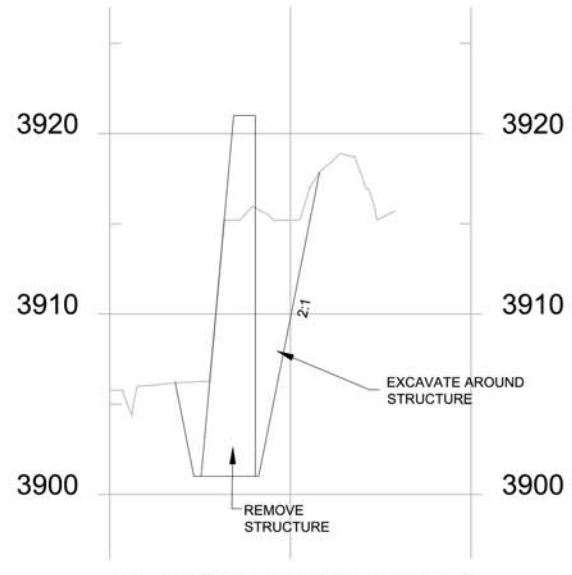
A DIVERSION CHANNEL SECTION

H 1"=50'
V 1"=5'



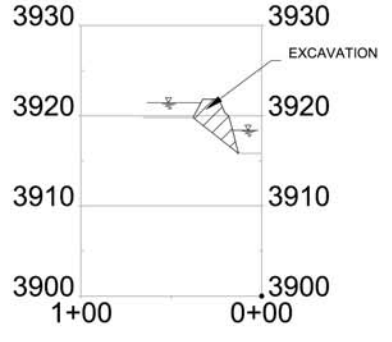
B DIVERSION STRUCTURE SECTION

H 1"=50'
V 1"=10'



C SMELTER DAM SECTION

H 1"=50'
V 1"=5'



D UPPER DAM BREACH SECTION

H 1"=50'
V 1"=5'

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Jay Dehner
JD
PJK
PK

Prickly Pear Creek Initial Diversions

FIGURE 2-13
Civil Plan Excavation Plan
Interim Measures Work Plan–2012 Draft
East Helena, Montana

Preliminary Concept

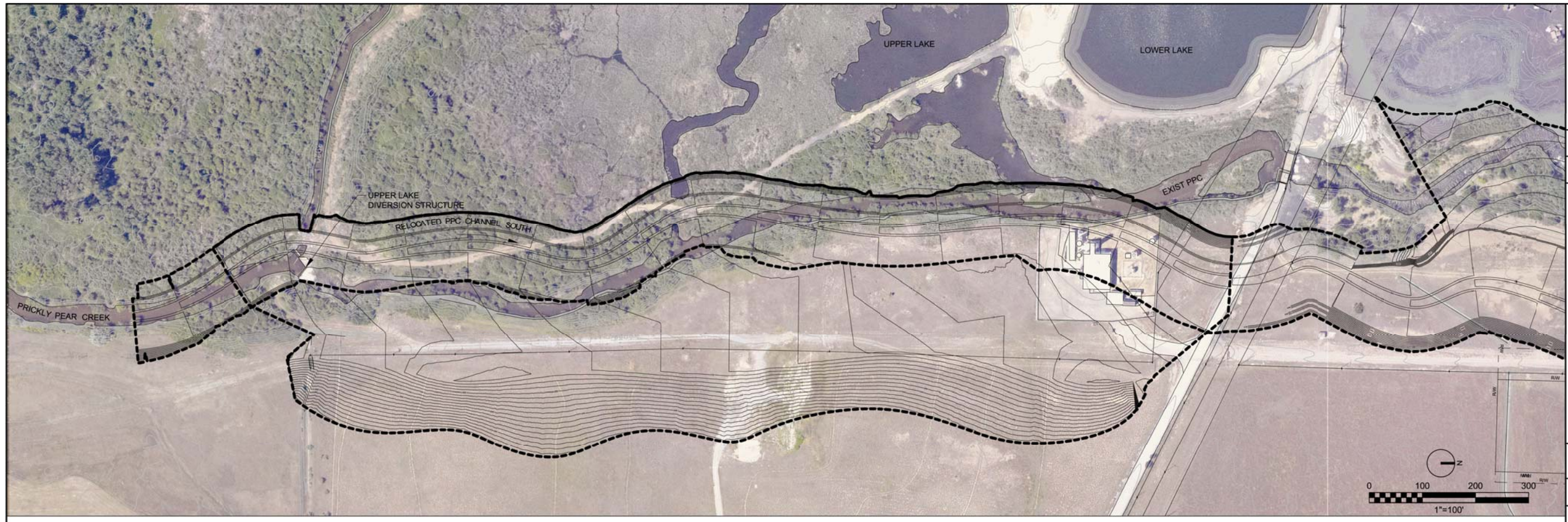
1"=100'

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

01-05-12
420947
FIGURE 1

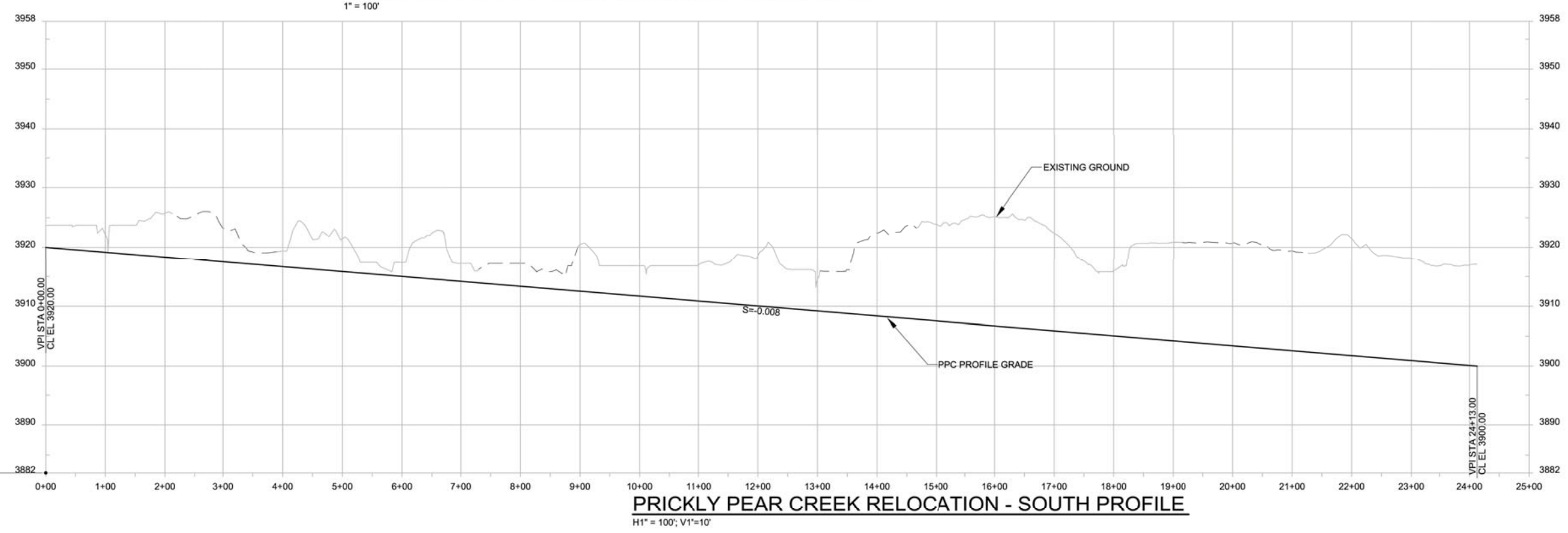
FILENAME: FIGURE1.DWG PLOT DATE: 5-Jan-12 PLOT TIME: 4:12 PM

ES032612024219PDX 420947.11.J1.J0 Rv3 6-07-12 lh



PRICKLY PEAR CREEK RELOCATION - SOUTH PLAN

1" = 100'



PRICKLY PEAR CREEK RELOCATION - SOUTH PROFILE

H1" = 100'; V1'=10'

Jay Dehner
JD
PJK
PK

METG

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Prickly Pear Creek Initial Diversions

FIGURE 2-14

Civil Plan PPC Relocation South

Interim Measures Work Plan–2012 Draft

East Helena, Montana

1"=100'

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

01-05-12

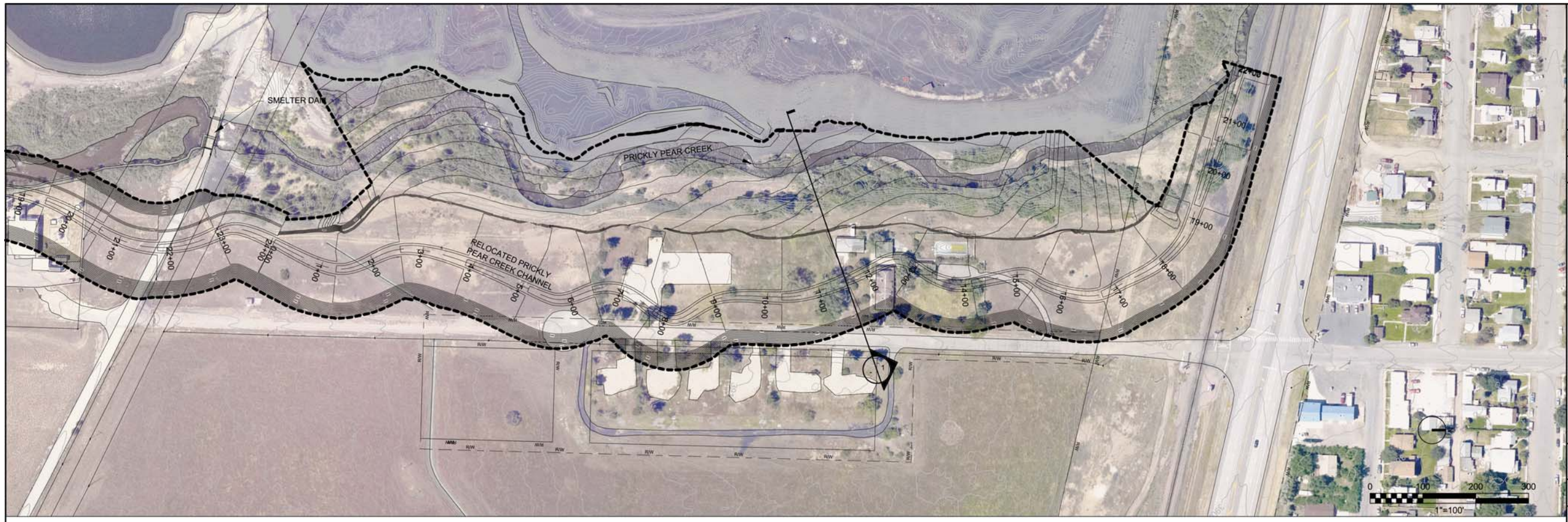
420947

FIGURE 5B

Preliminary Concept

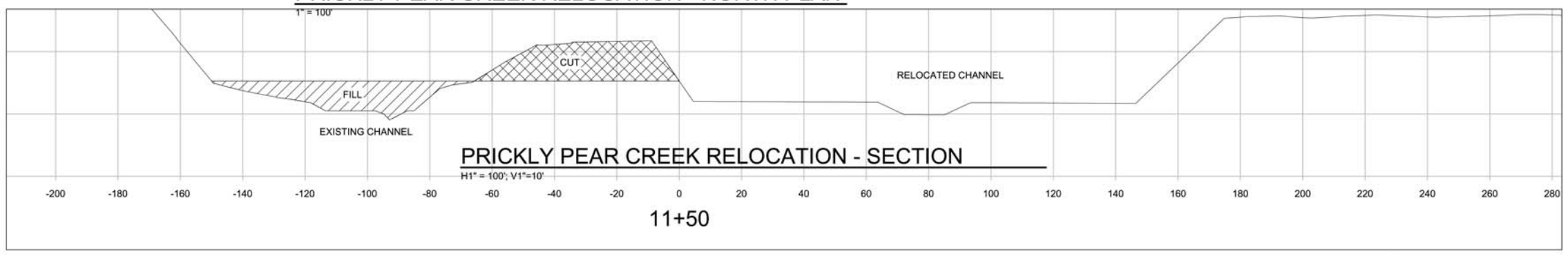
FILENAME: FIGURE5B.DWG PLOT DATE: 11-Jan-12 PLOT TIME: 10:59 AM

ES032612024219PDX 420947.11.31.30 Rv3 6-07-12 lh



PRICKLY PEAR CREEK RELOCATION - NORTH PLAN

1" = 100'

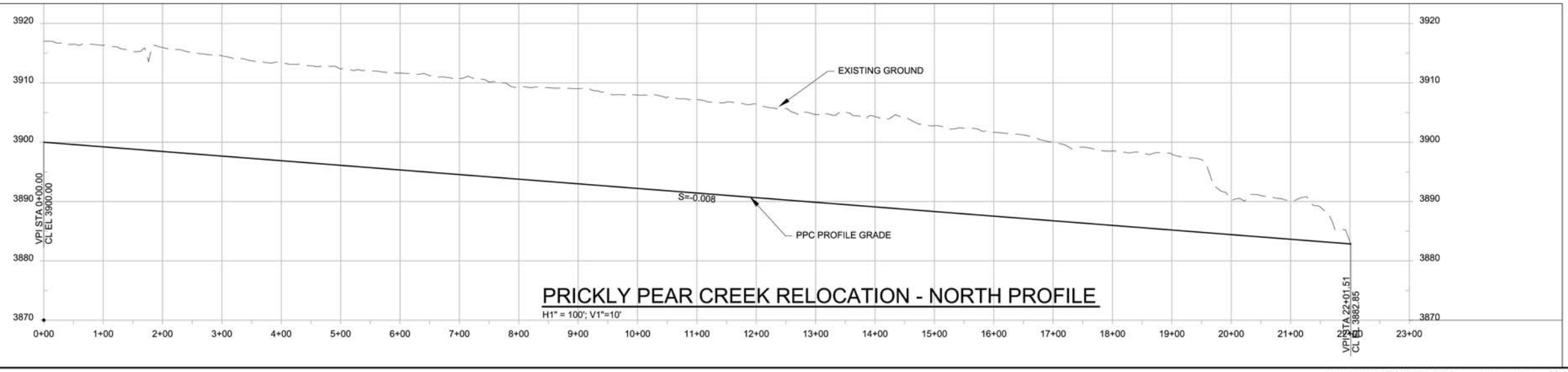


PRICKLY PEAR CREEK RELOCATION - SECTION

H1" = 100'; V1"=10'

-200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280

11+50



PRICKLY PEAR CREEK RELOCATION - NORTH PROFILE

H1" = 100'; V1"=10'

Jay Dehner
JD
PJK
PK

METG
Montana Environmental Trust Group

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Prickly Pear Creek Initial Diversions

FIGURE 2-15
Civil Plan PPC Relocation North
Interim Measures Work Plan–2012 Draft
East Helena, Montana

Preliminary Concept

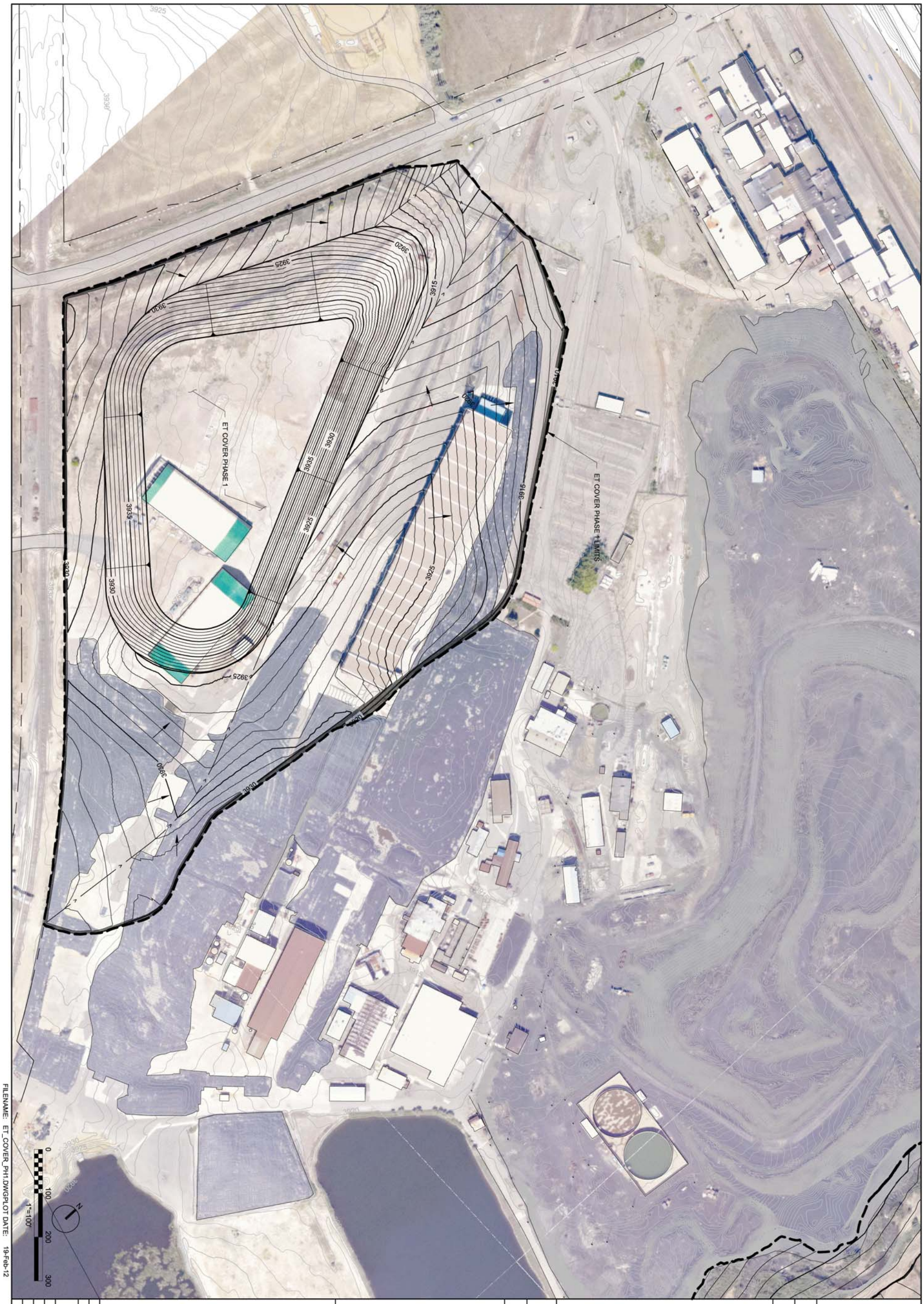
1"=100'

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

01-05-12
420947
FIGURE 5A

FILENAME: FIGURE5A.DWG PLOT DATE: 11-Jan-12 PLOT TIME: 8:30 AM

ES032612024219PDX 420947.11.1.30 Rv3 6-07-12 lh



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Prickly Pear Creek Initial Diversions

FIGURE 2-16

Civil Plan ET Cover Phase 1

Interim Measures Work Plan–2012 Draft

East Helena, Montana

PK	PJK	JD	Jay Dehner

1"=100'

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DSN-Sign-Date

420947

CX

X of X

FILENAME: ET_COVER_PH1.DWGPLOT DATE: 19-Feb-12

PLOT TIME: 4:34 PM

Preliminary Concept

FILENAME: ET_cover_ph2.dwg PLOT DATE: 2-Mar-12 PLOT TIME: 4:37 PM

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Prickly Pear Creek Initial Diversions

FIGURE 2-17

Civil Plan ET Cover Phasing 2, Phase 2

Interim Measures Work Plan–2012 Draft

East Helena, Montana

NO.	DATE	REVISION	BY	APVD

DSGN	DR	CHK	APVD
	PJK		

1"=100' VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE MARCH 2012 PROJ 420947 DWG SHEET of

CONCEPT PLANNING

FILENAME: ET_cover_ph3.dwg
PLOT DATE: 2-Mar-12
PLOT TIME: 4:44 PM

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Prickly Pear Creek Initial Diversions

FIGURE 2-18

Civil Plan ET Cover Phasing, Phase 3

Interim Measures Work Plan—2012 Beneficiary Review Draft
East Helena, Montana

NO.	DATE	REVISION	BY	APVD

DSGN	DR	CHK	APVD
	PJK		

DATE MARCH 2012
PROJ 420947
DWG
SHEET of

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

VERIFY SCALE

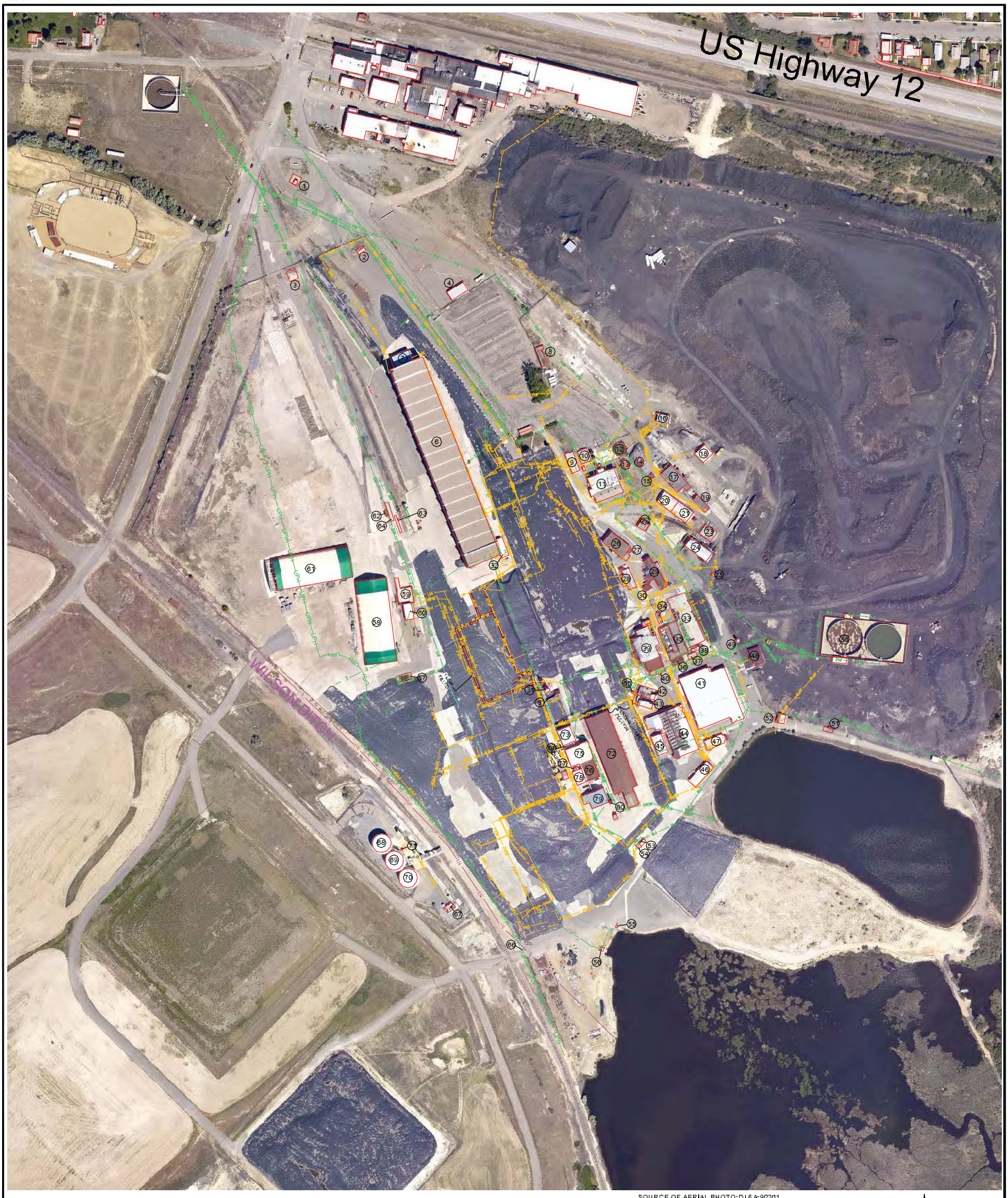
1"=100'

CONCEPT PLANNING

N

Not to Scale

FIGURE 2-19
Conceptual Layout of ET Cover IM
Interim Measures Work Plan–2012 Draft
East Helena, Montana



SOURCE OF AERIAL PHOTO: DJ&A; 9/22/11

LEGEND

ABANDONED UTILITIES

- ABANDONED WILSON DITCH
- NATURAL GAS LINES
- PLANT WATER
- UNDERGROUND ELECTRIC
- CITY WATER
- UNDERGROUND PHONE
- UPPER LAKE ACID PLANT WATER
- PLANT RETURN WATER
- SEWER
- UNDERGROUND AIR LINES

ACTIVE UTILITIES

- UNDERGROUND NATURAL GAS LINES
- OVERHEAD ELECTRICAL
- UNDERGROUND ELECTRICAL
- UNDERGROUND CITY WATER
- UNDERGROUND PHONE
- UNDERGROUND PLANT WATER (PRESSURIZED)
- UNDERGROUND PLANT RETURN WATER
- HDS RETURN WATER (PRESSURIZED)
- STORM WATER COLLECTION SYSTEM
- OVERHEAD PLANT RETURN WATER
- TEMPORARY ABOVE GROUND GAS
- ABOVE GROUND PLANT WATER
- RE-LOCATED WILSON DITCH

(10) BUILDING OR STRUCTURE (SEE FIG. 2 FOR I.D.)

N

150 75 0 150
SCALE IN FEET

MORRISON MAIERLE, INC.
An Employee-Owned Company
Engineers
Surveyors
Scientists
Planners

1 Engineering Place
Helena MT 59602
Phone: (406) 442-3050
Fax: (406) 442-7862

DRAWN BY: JMH
CHK'D. BY: LJB
APPR. BY: AKE
DATE: 3/2012

EAST HELENA SMELTER
EAST HELENA MONTANA

Existing Plant Structures, and Abandoned and Active Utilities

PROJECT NO. 2557.006

FIGURE NUMBER 2-20

R:\2557\006\ACAD\Exhibits\PLANT UTILITIES FIGURE 3.dwg Plotted by jonsvalason on Mar/19/2012

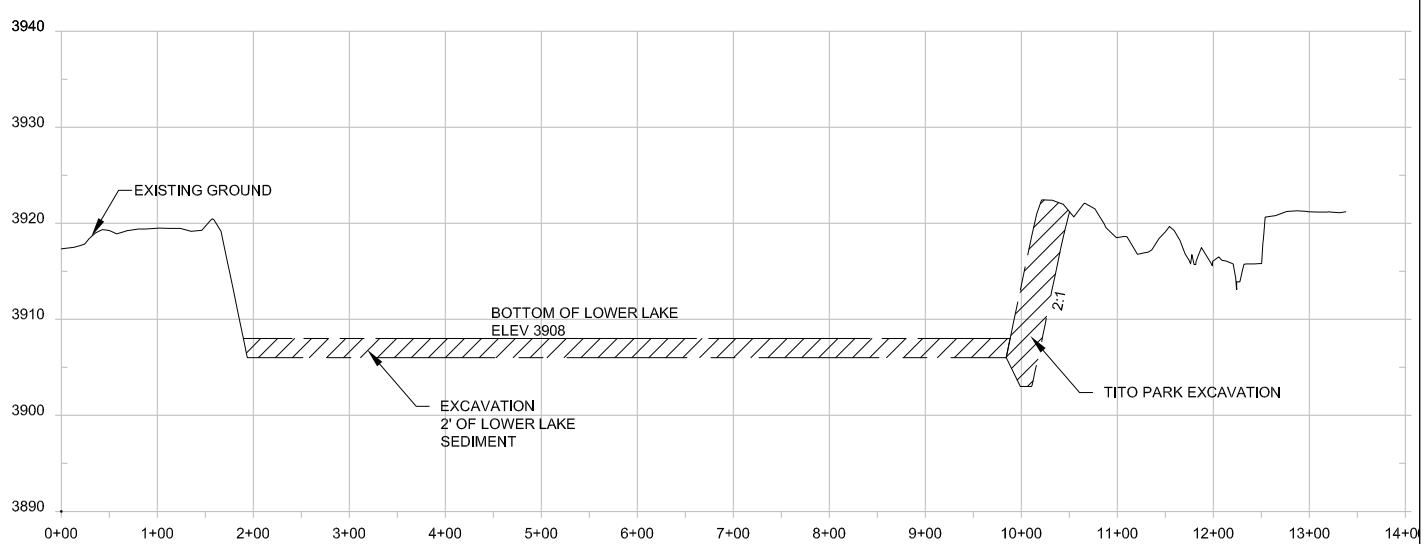
N

Not to Scale

FIGURE 2-21
Conceptual Layout of Source Removal IM
Interim Measures Work Plan–2012 Draft
East Helena, Montana

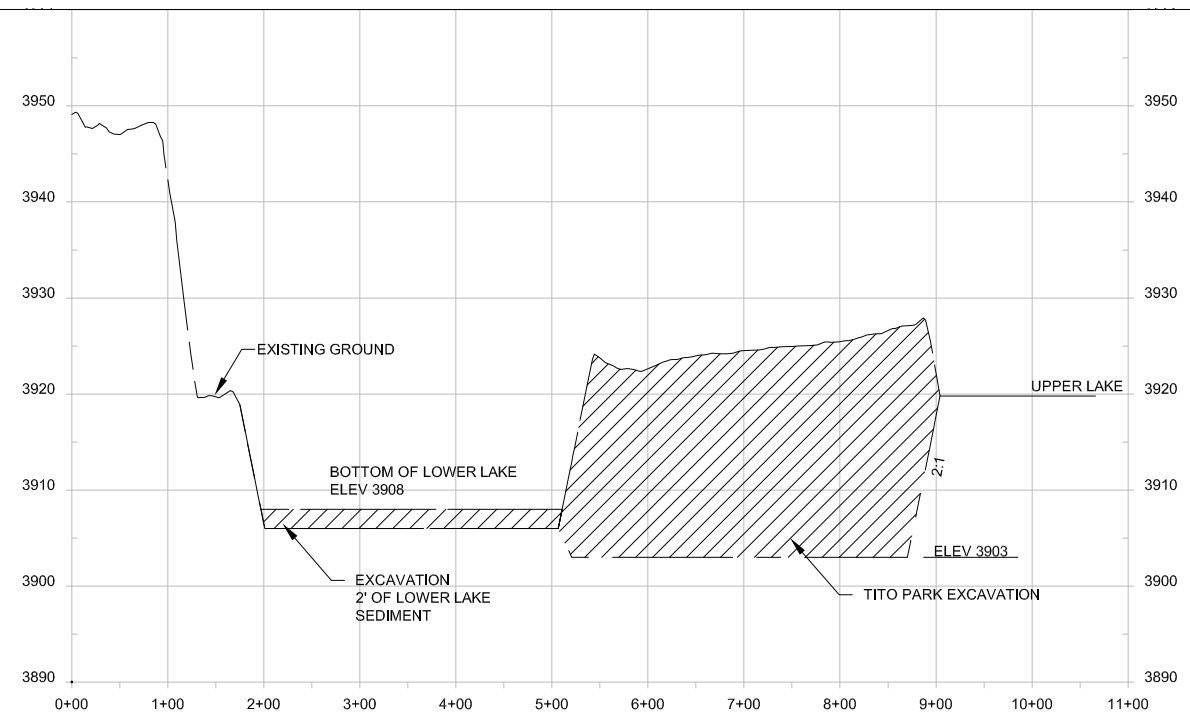
TITO PARK EXCAVATION PLAN

1"=100'



A EXCAVATION SECTION

X" = X'-X"



B EXCAVATION SECTION

X" = X'-X"

E:\63361\2924219\PDX_420947-11-30 Rv2 6-07-12.lh

Jay Dehner
JD
PJK
PK

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Prickly Pear Creek Initial Diversions

FIGURE 2-22
Conceptual Removal Plan for Tito Park Soils and Lower Lake Sediments
Interim Measures Work Plan—2012 Draft
East Helena, Montana

Preliminary Concept

1"=100'

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

01-05-12
420947
FIGURE 3

FILENAME: FIGURE3.DWG PLOT DATE: 24-Jan-12 PLOT TIME: 11:05 AM

SECTION 3

Conceptual Model of Contaminant Migration

This section describes the preliminary conceptual site model (CSM) for the former Smelter site, with a focus on contaminant migration conditions to be considered and addressed during the evaluation, design, and implementation of the proposed IMs. Existing information pertaining to contaminant migration at and from the former Smelter site is summarized in this section. This information will be used to establish performance measures and design parameters. The conceptual model will be updated to include the results of site evaluations and studies conducted during the development of this IM Work Plan 2012.

Section 3.1 focuses on the key aspects of the former Smelter site related to contaminant fate and transport of inorganic contaminants in groundwater. Section 3.2 summarizes the site conditions most relevant to the SPHC, ET Cover System, and Source Removal IMs.

3.1 Facility Description

ASARCO's Smelter began operating in 1888 and shut down in April 2001. Although lead bullion was the primary product, the Smelter also produced zinc (from 1927 to 1982), sulfuric acid, and matt- and copper-enriched speiss. The waste products produced by the Facility included Smelter stack emissions, fugitive emissions from smelting operations, slag, acid plant sludge, and wastewater from scrubber systems. The manufacturing, regulatory, and environmental history of the former Smelter site has been well documented, most recently in the draft Phase II RFI Report.

3.1.1 Location and Hydrology

The 142-acre former Smelter site is located in the Helena Valley, approximately 3 miles east of the City of Helena. The former Smelter site is bounded to the north by Highway 12 and the American Chemet facility; to the south by Upper Lake, Tito Park, and Lower Lake; to the east and northeast by PPC; and to the west and southwest by open agricultural land and the Manlove neighborhood (Figure 3-1). The natural topography slopes gently to the north and the center of the former Smelter site and is approximately 3,900 feet above mean sea level (AMSL). The climate is classified as modified continental and has cold winters, moderate summertime temperatures, 11.2 inches of annual precipitation, and 8.5 to 9.6 inches of annual evapotranspiration. The prevailing wind blows east. Surface water bodies at or near the former Smelter site are shown on Figure 3-1 and summarized in Table 3-1.

TABLE 3-1
Surface Water Bodies

Body of Water	Purpose	Sources of Water[b]	Discharge[b]	Size[c]
PPC[a]	Natural drainage used for mining, agricultural, industry	Headwaters in mountains, seepage from groundwater	Surface flow to Lake Helena (7 miles downstream), seepage to Upper Aquifer, diversion to Upper Lake and Upper Lake Marsh	25 to 30 ft^3/s (base flow), 50 to 300 ft^3/s (seasonal peak flow)
Upper Lake	Former Smelter water supply	Surface diversion from PPC	Surface flow to PPC, release to Wilson Ditch (seasonal), seepage to Upper Aquifer	20 acres (surface area), 5 to 12 feet (depth)
Upper Lake Marsh	Former Smelter water supply	Surface diversion from PPC	Surface flow to Upper Lake, seepage to Upper Aquifer	Inches to 2 feet (depth)
Wilson Ditch[d]	Agricultural	Released from Upper Lake (seasonal)	Seepage to Upper Aquifer (seasonal)	1.46 to 8.26 ft^3/s (seasonal)
Lower Lake	Former process water pond	Treated stormwater, formerly process water	Seepage to Upper Aquifer	7 acres (surface area), 11 million gallons (capacity)

[a] PPC flows north. It receives flow from groundwater near Facility and loses flow to groundwater up and downstream of Facility.
[b] Table omits direct precipitation into and evaporation from bodies of water.
[c] ft^3/s = cubic feet per second; HDPE = high-density polyethylene.
[d] Ditch runs through an underground HDPE pipe alongside the Facility, and an open unlined ditch downstream of the Facility.

3.1.2 Geology

The former Smelter site is located on an alluvial plain consisting of relatively thin layers of alluvium, colluvium, sands, and gravels (Figure 3-2). The younger sediments overlie thicker layers of stratified volcanic tuff and bedrock (Figure 3-3). The southern side of the Helena Valley is defined by a series of major seismically active faults, including one inferred to be approximately 1,500 feet north of the Facility. The soil layers are summarized in Table 3-2.

TABLE 3-2
Typical Soil Layers

Soil Layer Name	Layer Symbol	Predominant Soil and Rock Types	Typical Thickness (feet)	Typical Permeability
Quaternary Alluvial Deposits, Alluvium, and Colluvium[a]	Qa, Qal, Qac	Cobbles, gravels, and sands; with silt/clay further from stream channels	Few to 60	Water-bearing layer
Younger Tertiary Alluvial Sediments	QTg	Weakly cemented sand and gravel	0 to 60	Likely less than overlying material
Early Tertiary (Oligocene) Sediments	OgTs, OgS	Stratified volcanic tuff with interbedded clastic sediments, weathered clayey ash at top	40 to 60[b]	Variable, but in general relatively low
Spokane Formation Metasedimentary Basement Rock[c]	Ys	Argillites, siltites, slates quartzites	Unknown	Extremely low (unless fractured)

[a] This layer forms the existing ground surface at the Facility. There is a thin veneer of silt across much of Facility.
[b] At north end of Facility. Thickness is undefined elsewhere bottom of layer is more than 100 to 150 feet below ground surface (bgs) in places.
[c] This layer is "bedrock."

3.1.3 Hydrogeology

Groundwater under the former Smelter site flows in two aquifers that are separated by an aquitard of weathered clayey-ash (Figure 3-4). The general flow direction is north to northwest with some seasonal fluctuation (Figures 3-5 and 3-6). Surface water bodies (primarily PPC, Lower Lake and Upper Lake) located at the southern end of the former Smelter site are a significant source of recharge to the Upper Aquifer, and thus the focus of the SPHC IM. The typical hydrostratigraphic units are summarized in Table 3-3. Groundwater is monitored using a network of wells (Figure 3-7).

TABLE 3-3
Typical Hydrostratigraphic Units

Unit Name	Soil Layer[a]	Source of Recharge[b]	Discharge Locations	Groundwater Gradient[d]	Hydraulic Conductivity[e]	Comments
Valley-Fill Sediments (Upper Aquifer)	Qa, Qal, Qac, QTg	Surface water bodies[c], seepage from irrigation ditches/canals, discharge from deeper aquifer	Groundwater wells, springs, seepage to PPC, Lake Helena, and gravel ponds	Horizontal is 0.012-0.025 foot/foot; Vertical is downward at <0.01-0.12 foot/foot	14.29 to 66.67 feet/day	Upper Lake, Lower Lake, and Wilson Ditch cause groundwater mounding
Oligocene weathered clayey-ash (aquitard)	Top of OgTs, OgS	Not applicable	Not applicable	Not applicable	Not applicable	Discontinuous to west, presence not confirmed to east
Deep groundwater system and bedrock	Ys , and lower part of OgTs and OgS	Snow melt, direct precipitation, seepage from losing streams	Lake Helena, seepage into gaining streams, springs, seepage to Valley-Fill aquifer	Upward into upper aquifer at 0.061 to 0.082 foot/foot	2.7 to 11.5 feet/day	Presence and extent not known

[a] Refer to Table 3-2 for description of soil layers.
[b] Table emits snowmelt and direct precipitation into both aquifers.
[c] Refer to Table 3-1 for description of surface water bodies.
[d] Gradients vary by location.
[e] Determined by pump testing.

3.1.4 Nature and Extent of Groundwater Contamination

The SLVs referenced in this section are the SLVs used in the draft Phase II RFI Report to make a preliminary assessment of potential threats to human or ecological receptors that may come in contact with contaminants in groundwater, surface water, soil, and/or sediments. The SLVs are shown in the draft Phase II RFI Report, Table 4-2 (see Appendix B).

Arsenic and selenium are the primary constituents of potential concern (COPCs) in groundwater. Monitoring data collected to date show the arsenic and selenium plumes (as defined by areas where COPCs are present in groundwater at concentrations, which exceed project SLVs), have migrated to areas north and northwest of the former Smelter site. Groundwater data also show that the other site-related contaminants are found within the aerial extent of the arsenic and selenium plumes.

Arsenic has the highest exceedance rate of any measured constituent and approximately 43 percent of samples collected from 2008 to 2010 exceed the 0.01 milligram per liter (mg/L) drinking water standard. The arsenic plume extends, generally, north and northwest of the site (Figure 3-8) and is centered on former processing and material handling areas. Concentrations reach a maximum of more than 100 mg/L near the former Speiss-Dross Area. Arsenic concentrations within the plume are relatively high and uniform with depth in the Upper Aquifer. Concentrations below the aquitard are low (consistent with low soil concentrations in the aquitard). Downgradient of the site, arsenic concentrations rapidly decrease by approximately three orders of magnitude and at most downgradient paired wells concentrations are below the background value. Soil arsenic concentrations decrease before reaching the water table in most downgradient locations. This suggests that unsaturated soils may not be a source to groundwater in areas where the water table is relatively deep. Although the lateral extent of the arsenic plume appears to be relatively stable, some migration to the northwest has occurred between 1998 and 2010 (Figures 3-9 and 3-8, respectively). Arsenic is not predicted to form stable secondary mineral phases in groundwater. This suggests that arsenic oxide minerals (related to air emission sludges and dusts) and sulfide solid-phases (present in slag and ore concentrate) are unstable and will dissolve over time.

In oxygenated groundwater, selenium is more mobile than arsenic and the footprint of the downgradient plume is larger than arsenic (Figure 3-10). The selenium plume extends generally north-northwest of the site. The onsite portion is divided into an eastern lobe and a western lobe that flank the former Speiss-Dross Area. The eastern lobe is centered under the slag pile with maximum concentrations ranging from 1 to 1.5 mg/L. The western lobe is centered around the former Thaw House and OSHB where maximum concentrations exceed 7 mg/L. The vertical extent of contamination is limited to the Upper Aquifer. The northwest trending plume extends into Lamping Field and generally parallels PPC. The northernmost sampled residential wells show selenium concentrations above background but below the Maximum Contaminant Levels (MCLs) with relatively low concentrations in the two most upgradient wells. The transient nature of the plume is consistent with the predominant chemical form of selenium in groundwater being Se(VI), the most-mobile redox species (Figures 3-11 and 3-10, respectively). This behavior contrasts with arsenic, which tends to be sequestered by minerals in the aquifer matrix.

Although arsenic and selenium are the primary COPCs, numerous constituents in groundwater continue to exceed the project SLVs. These constituents include aluminum, antimony, arsenic, cadmium, iron, lead, manganese, mercury, selenium, thallium, vanadium, and zinc (draft Phase II RFI Report Table 11-2; see Appendix B). Groundwater within, and in some areas downgradient, of the former Smelter site also exceeds federal Secondary Maximum Contaminant Levels (SMCLs) for sulfate, chloride, and total dissolved solids (TDS) (although SMCL exceedances do indicate a risk to human health). Offsite exceedances of groundwater SLVs are limited to antimony, arsenic, manganese, and selenium (draft Phase II RFI Report Table 11-2; see Appendix B).

3.1.5 Nature and Extent of Soil Contamination

This section focuses on the extent of arsenic and selenium in soil on the former Smelter site because these soils are the remaining source of contamination to groundwater. The soil sampling data from locations within the clouded area shown in Figure 3-7 are most relevant to this analysis and are the basis for the following discussion.

These data, a subset of the data presented in the draft Phase II RFI Report, are summarized in the RFI tables provided in Appendix B.

The concentration of arsenic in surface soils (i.e., less than 1 foot below ground surface [bgs]) varies widely across the former Smelter site, from 8 to 11,500 milligrams per kilogram (mg/kg), with an average between 1,000 and 2,000 mg/kg, as shown in Table 3-7 (see Appendix B). In the general vicinity of the LOSA, concentrations decrease with depth in most locations until reaching the water table. These concentrations exceed the SLV of 1.6 mg/kg (for industrial land use), as well as the concentration of 0.29 mg/kg that is USEPA's screening level considered to be protective of groundwater. The highly contaminated surface soils indicate that direct contact and surface erosion are concerns. The data also suggest that precipitation and stormwater may have leached arsenic into deeper soils.

The data in Tables 3-5, 3-6, and 3-8 (see Appendix B) show that the selenium concentrations in surface soils (i.e., less than 1 bgs) vary widely from 0.49 to 1,310 mg/kg, with an average between 50 and 150 mg/kg. The concentrations increase slightly in the first foot of depth, then decrease with depth until reaching less than 5 mg/kg or nondetect levels at approximately 10 feet bgs. The selenium data suggest that concentrations in the soil, at shallow depths, are greater than project SLVs and background. The highly contaminated surface soils indicate that direct contact and surface erosion are concerns, although declines in concentrations with depth suggests that precipitation and stormwater may have not leached selenium into deeper soils.

No Smelter operations occurred on the east bank of PPC (i.e., the tertiary bench). Contaminated soil from the residential yard cleanup program, however, was placed in the East Fields Soil Repository in connection with historic remediation of residential yards, alleyways and other areas of East Helena performed under CERCLA. The contaminated soils were blended into existing soils. In addition, windborne contaminants have been transported eastward and deposited on the ground surface. A limited number of surface soil samples have been collected from the tertiary bench (Figure 3-7). These data suggest that the shallow surface soils contain arsenic at concentrations greater than project SLVs (Table 3-9; see Appendix B). The data also suggest that the surface concentrations begin to decrease within a few feet of the ground surface. The data further suggest that selenium exists in surface soil at concentrations greater than background, and that concentrations decrease to levels protective of groundwater a few feet bgs.

Slag produced by Smelter operations has been piled along the west bank of PPC. The perimeter of the slag pile hugs the northeast potions of PPC. In that location, surface water flows have historically eroded into/under the slag pile and transported slag material downstream.

3.2 Former Smelter Site Conceptual Contaminant Transport Model

The conceptual model for contaminant transport at and from the former Smelter site is summarized as follows:

- Historical operations at the former Smelter site were the original sources of contamination to soil and groundwater. This included stack emissions, materials handling and storage, waste disposal practices, leaks from process water systems, and infiltration from dust suppression activities. These operational sources were eliminated when Smelter operations ceased in 2001. The primary ongoing sources to groundwater and soil are attributable to residual contamination left by historical operations.
- IMs implemented by ASARCO were designed to address some of the known source areas, such as the Speiss-Dross Area, the Thaw House, the Monier Flue/Baghouse, the Blast Furnace, and the Acid Plant. Structures in these locations were demolished, soil in some locations was excavated, and temporary high-density polyethylene (HDPE) covers were placed over areas where demolition occurred to prevent direct contact with contaminated soils and reduce infiltration of precipitation and leaching to groundwater. The temporary covers also prevent windblown particulate transport and reduce precipitation infiltration. Metal-impacted soils in the Speiss-Dross Area and Acid Plant sediment disposal areas were encapsulated within slurry walls in 2006 and 2007.

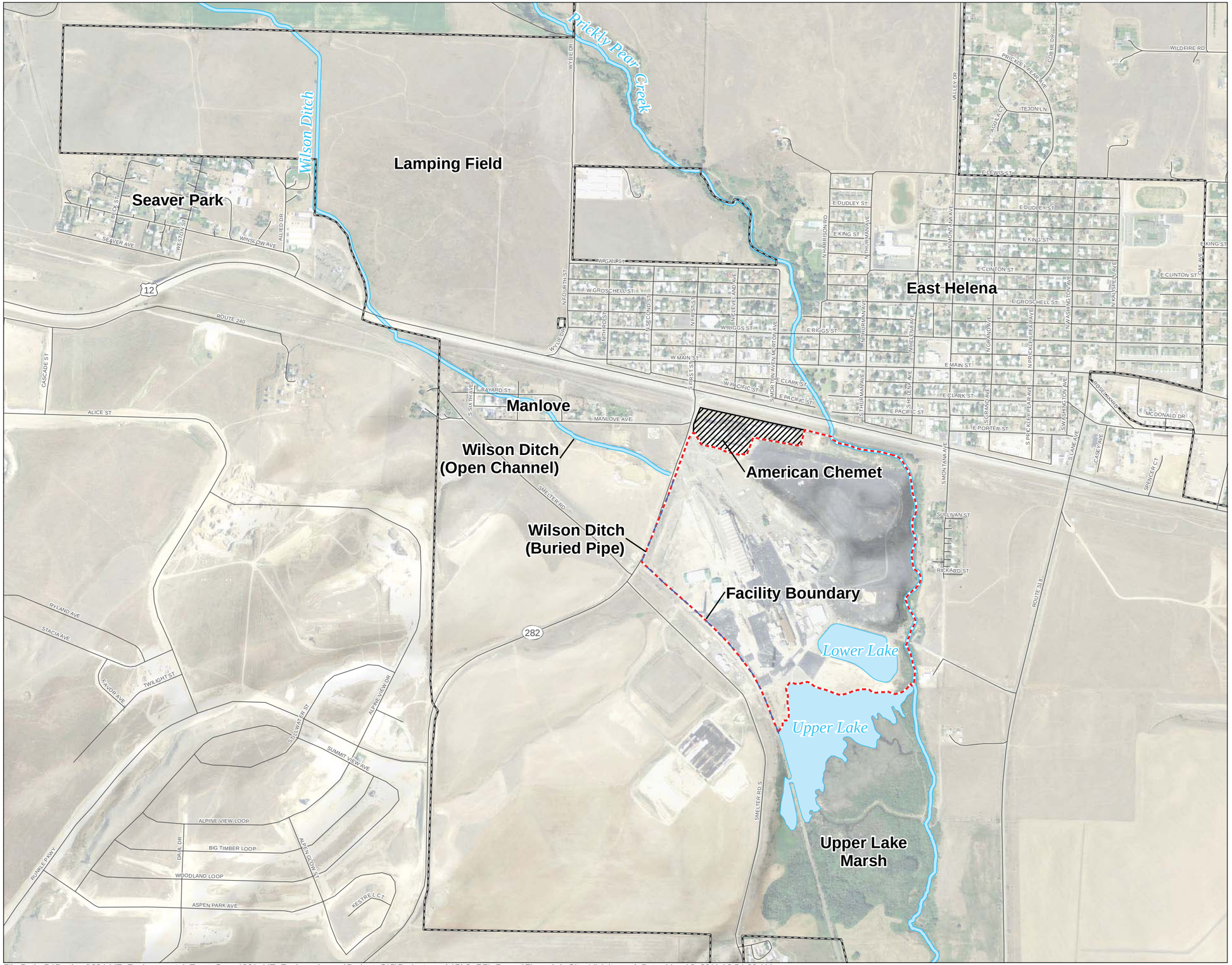
- The primary current sources for arsenic and selenium contamination in groundwater at the former Smelter site include Lower Lake sediments, saturated soil, unsaturated soil, and slag.
  - Saturated soils appear to be the most-significant ongoing source of arsenic loading to groundwater (draft Phase II RFI Report, Section 13.2.4).
  - Although saturated soil may be the source of selenium in the lower concentration portions of the selenium plume, the primary source of selenium appears to be the historical discharge of process water to Lower Lake (draft Phase II RFI Report, Section 13.2.4). Unfumed slag is also capable of leaching selenium to groundwater (draft Phase II RFI Report, Section 13.2.4).
  - Groundwater flowing onto the former Smelter site is largely free of contaminants.
- Groundwater flowing through contaminated saturated soils is currently the most significant contaminant transport mechanism.
  - Seepage from Upper Lake and Lower Lake on the southern end of the former Smelter site provides a significant source of recharge to the groundwater system and maintains a driving head that impacts groundwater flow gradients and velocities. Seepage from PPC also provides localized recharge to the Upper Aquifer (draft Phase II RFI Report, Section 13.1.3).
  - Surface water infiltration from PPC, Upper Lake, Lower Lake, and Smelter Dam raise groundwater elevations at the southern end of the former Smelter site. This increases contact between groundwater and contaminated soil and sediments in the SPHC area and the entire site.
  - Smelter Dam was originally constructed to raise the water level in PPC to help divert water into Upper Lake and Upper Lake Marsh for use in smelter operations.
  - The groundwater flow patterns, the erosion trough (or paleo-channel) in the top of the weathered tuffaceous sediment, and groundwater mounding associated with surface water infiltration all affect the movement of the arsenic and selenium plumes (draft Phase II RFI Report, Section 7.5).
  - Precipitation and stormwater runoff infiltrating into unsaturated soils may also be a mechanism to leach contaminants from soil to groundwater.
- The former Smelter site is graded to manage stormwater at the site. As a result, stormwater is not a transport mechanism.
- Data confirm the presence of elevated concentrations of arsenic, cadmium, copper, lead, and selenium in stormwater runoff from the LOSA. The former Smelter site, however, is graded to prevent stormwater from running off the site. The stormwater runoff and any associated solids are contained on the former Smelter site, conveyed to the HDS water treatment plant, treated, and ultimately discharged into Lower Lake.
- Stormwater also infiltrates into the soil and can leach contaminants downward to groundwater. Soils data suggest that arsenic and selenium concentrations above background are found below the ground surface. The concentrations generally decrease with depth.
- Windblown dust is a less-significant transport mechanisms but this must be confirmed by monitoring. Elevated contaminant concentrations are found in the surface soils. Surface soil particles can be picked up wind and blown onsite or to other locations onsite. This problem is exacerbated when surface soils are dry, disturbed, uncovered, and/or unvegetated.

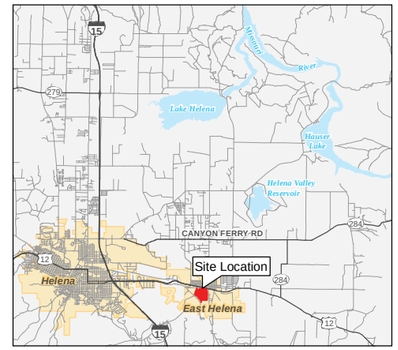
In summary, the conceptually proposed IMs are being designed to address the migration of high concentrations of contaminants in surface soils and groundwater from the former Smelter site to offsite areas. The SPHC IM focuses on lowering the groundwater elevations and reducing groundwater gradients (which in turn reduces groundwater velocities) by substantially reducing the surface water recharge on the south end of the former Smelter site. This will decrease the contaminant mass in groundwater leaving the site by reducing the amount of groundwater that comes into contact with contaminated soils, and reducing groundwater velocities. The volumes of contaminated

soil and sediments being excavated under the Source Removal IM will further reduce the mass of contaminants that are in contact with groundwater. The ET Cover System IM will prevent direct contact with contaminated surface soils and eliminate infiltration of precipitation, which will reduce the potential for leaching to groundwater and the amount of recharge from stormwater at the former Smelter site and thus the potential transport of COPCs via stormwater. Although this potential migration pathway is currently being controlled by the collection and treatment of stormwater in the HDS water treatment system, installation of the ET cover system will eliminate contact between clean stormwater and contaminated soils such that active stormwater management and treatment is no longer required.

FIGURE 3-1
Site Vicinity
Interim Measures Work Plan–2012 Draft

Phase II RFI Report
East Helena, Montana





LEGEND

- Facility Boundary
- American Chemet Facility
- East Helena City Limits
- Pipe (buried)
- Roads
- Surface Water Features
- Waterbodies

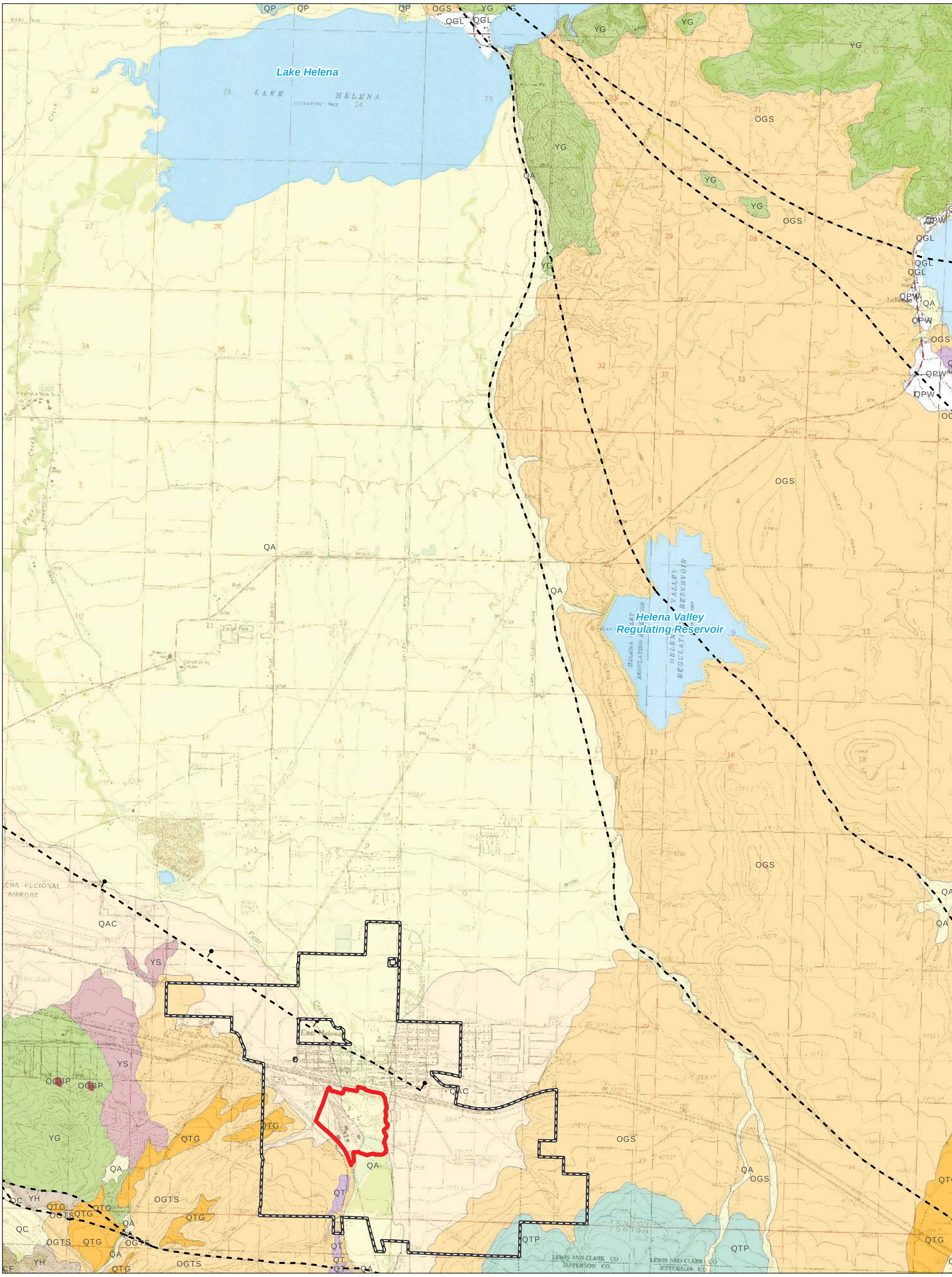
N

0 500 1,000 1,500
Feet

MAP NOTES:
Date: May 12, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS, ESRI

GSI Water Solutions, Inc.

File Path: P:\Portland\394-MT_Environmental_Trust_Group\001_MT_Environ_Asarco\Project_GIS\Project_mxds\Ph2_RFI_Report\Figure1-1_Site_Vicinity.mxd, Date: May 12, 2011 10:54:06 AM



LEGEND

- Facility Boundary
- East Helena City Limits
- Faults (ball on downthrown side of fault)

Geologic Units

- OGbp
- Qa
- Qac
- QTg
- Qt
- QTp
- OgTs
- Ys
- Yh
- Yg
- Water

MAP NOTES:
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Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS
Modified from Reynolds and Brandt, 2005

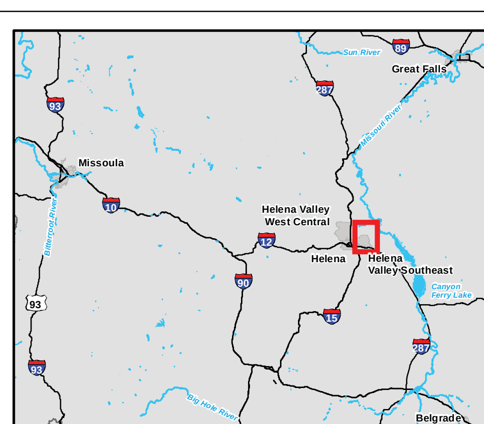


FIGURE 3-2
Geology of Helena Valley
Interim Measures Work Plan–2012 Draft
Phase II RFI Report
East Helena, Montana

N

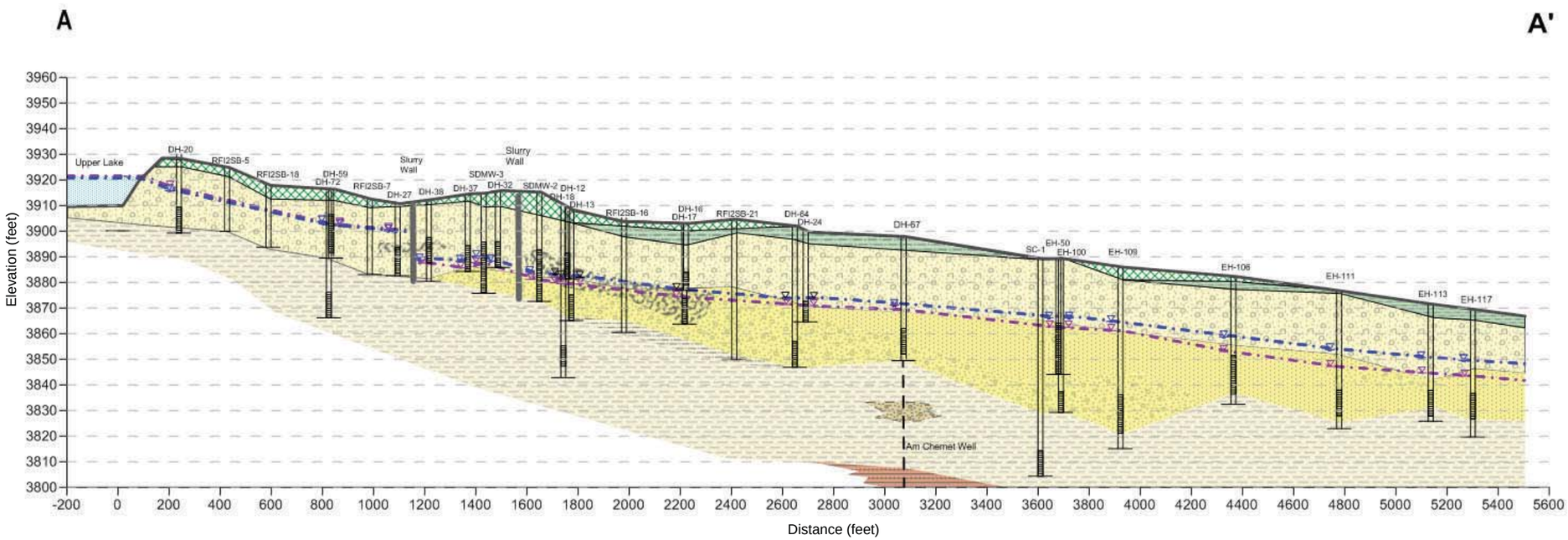
0 1,500 3,000 4,500
Feet

GSI Water Solutions, Inc.

FIGURE 3-3
Geologic Cross Section A-A'

Interim Measures Work Plan–2012 Draft

Phase II RFI Report
East Helena, Montana



LEGEND

- Slag
- Fill
- Holocene Silt
- Holocene Organic Silt (marsh/wetland sediments)
- Quarternary Sand & Gravel
- Quarternary/Tertiary Sand
- Quarternary/Tertiary Silty Sand & Gravel
- Undifferentiated Tertiary Silt, Silty Sand & Silty Gravel
- Tertiary Volcaniclastic Sediment Unit (weathered and/or reworked ash tuffaceous sedimentary deposits)
- Tertiary Interlayered F. Sand & Volcaniclastic Silt/Clay
- Tertiary Sand & Gravel
- "Burnt Shale" (as described in drillers log, indurated clay or argillite of the Spokane Formation)
- Hydrocarbon Stained Soils
- June 2010 Static Water Level
- October 2010 Static Water Level

Reference: Hydrometrics, 2011, unpublished work

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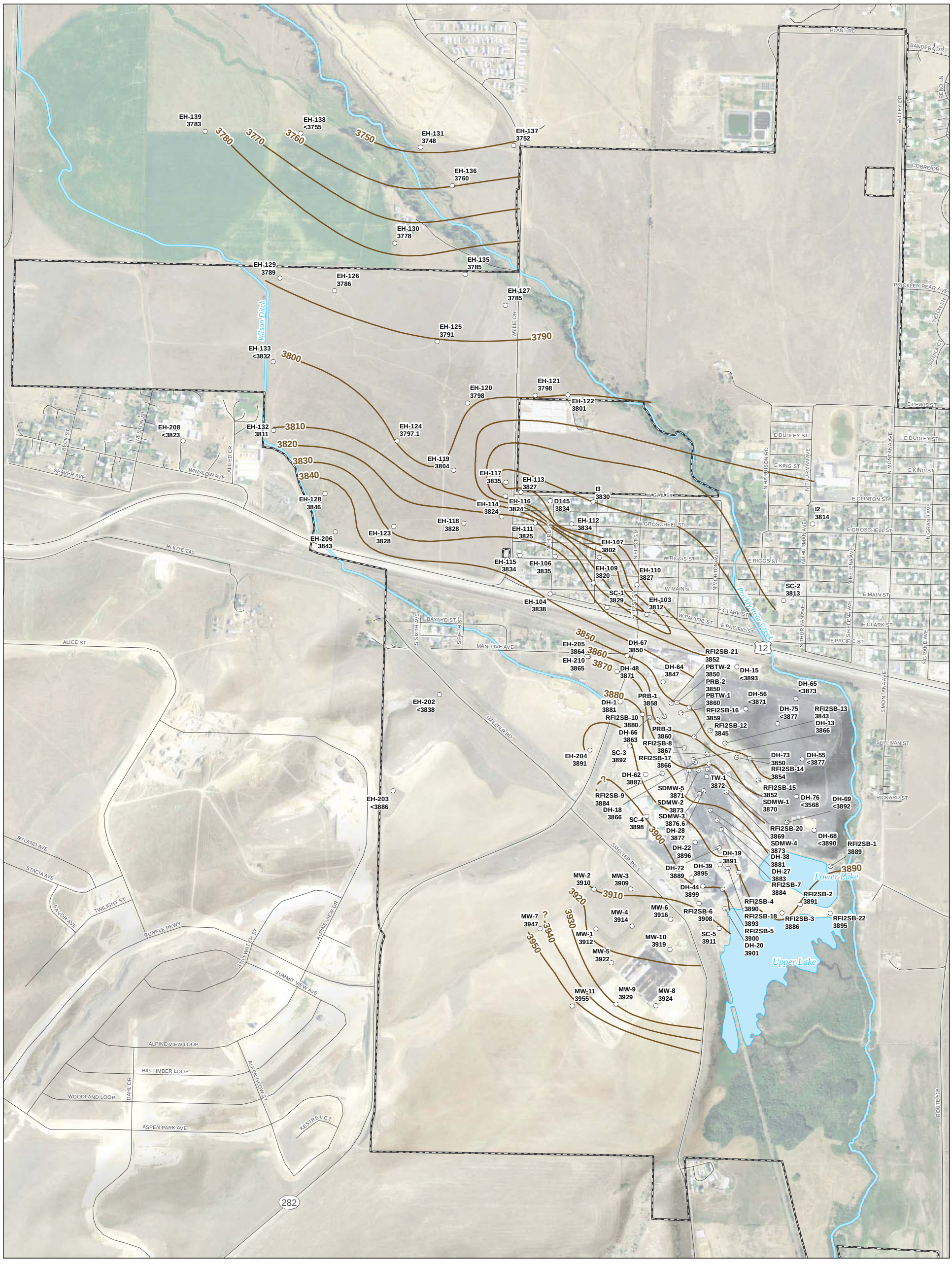


LEGEND

- Monitoring Wells or Borings
- EH_XX — Boring or Well Designation
- 3828 — Top of Weathered Tuffaceous Sediment Surface Elevation
- <3838 — Weathered Tuffaceous Sediment Surface not Identified in Boring Above Listed Elevation
- Weathered Tuffaceous Sediment Surface Contours (Dashed Where Inferred)

All Other Features

- East Helena City Limits
- Roads
- Surface Water Features

MAP NOTES:
Date: May 12, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

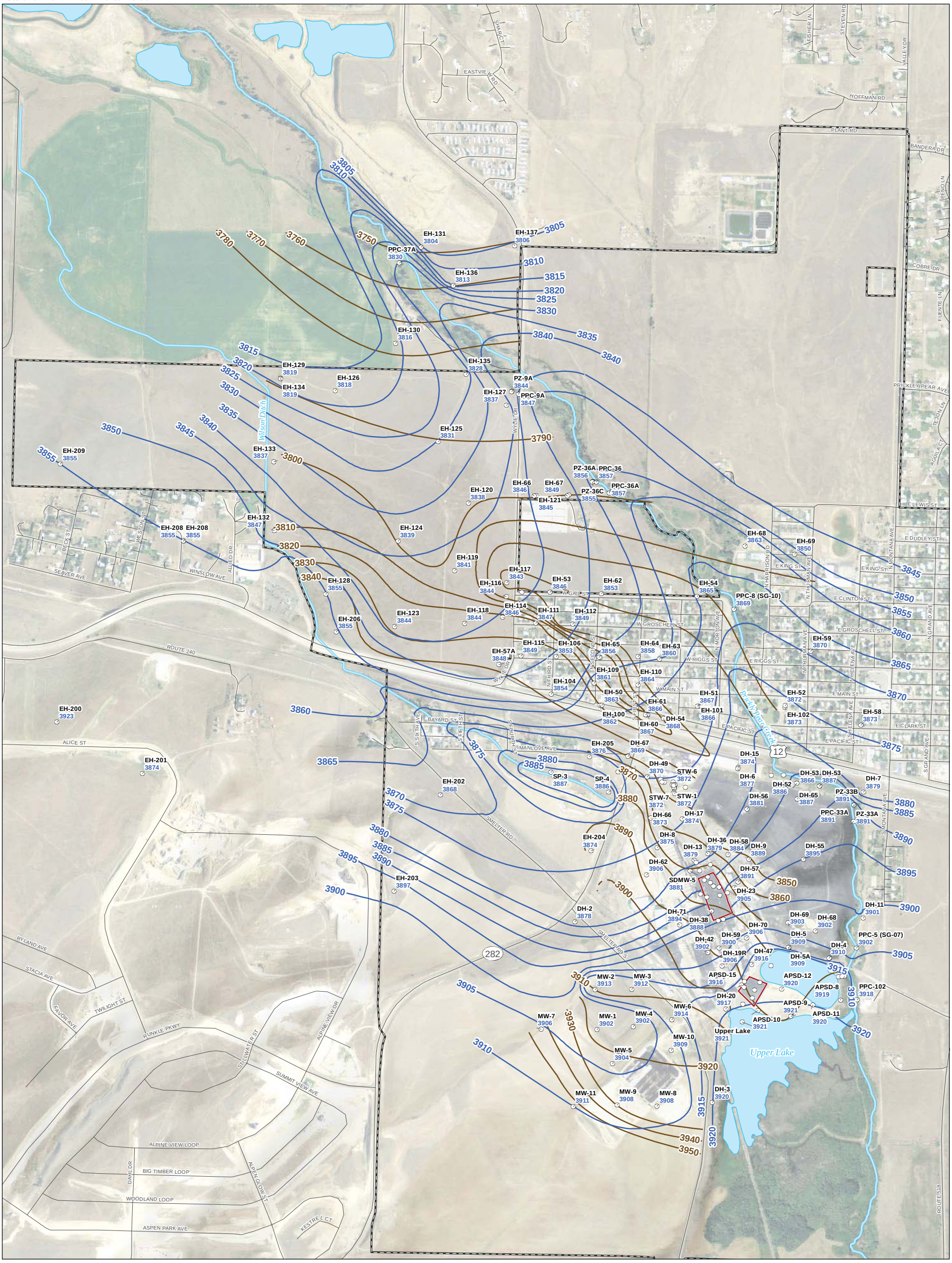
FIGURE 3-4
Surface Contour Map of
Weathered Tuffeceous Sediment Surface
Interim Measures Work Plan–2012 Draft

Phase II RFI Report
East Helena, Montana

N

0 500 1,000 1,500
Feet

GSI Water Solutions, Inc.



LEGEND

- Samples with Water Levels
- June 2010 Water Level Contours
- Weathered Tuffaceous Sediment Surface Contours (Dashed Where Inferred)
- East Helena City Limits
- Roads
- Surface Water Features

All Other Features

- Slurry Wall and Cap

MAP NOTES:
Date: April 25, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

FIGURE 3-5
Water Level Elevation
June 2010
Interim Measures Work Plan–2012 Draft

Phase II RFI Report
East Helena, Montana

N

0 500 1,000 1,500
Feet

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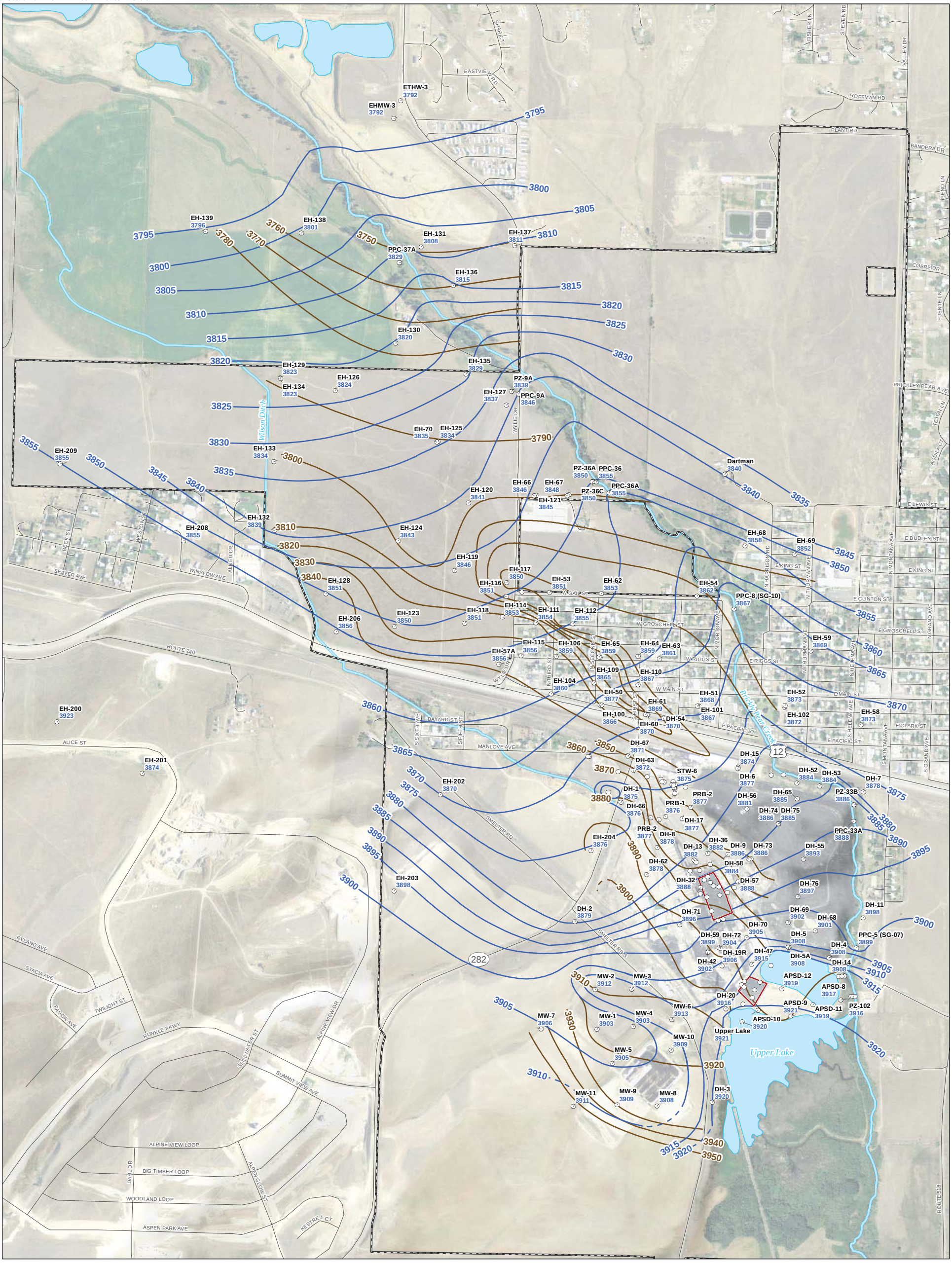

LEGEND

- Samples with Water Levels
- October 2010 Water Level Contours (Dashed Where Inferred)
- Weathered Tuffaceous Sediment Surface Contours (Dashed Where Inferred)
- East Helena City Limits
- Roads
- Surface Water Features

All Other Features

- Slurry Wall and Cap

MAP NOTES:
Date: April 25, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

FIGURE 3-6
Water Level Elevation
October 2010
Interim Measures Work Plan–2012 Draft

Phase II RFI Report
East Helena, Montana

N

0 500 1,000 1,500
Feet

GSI Water Solutions, Inc.

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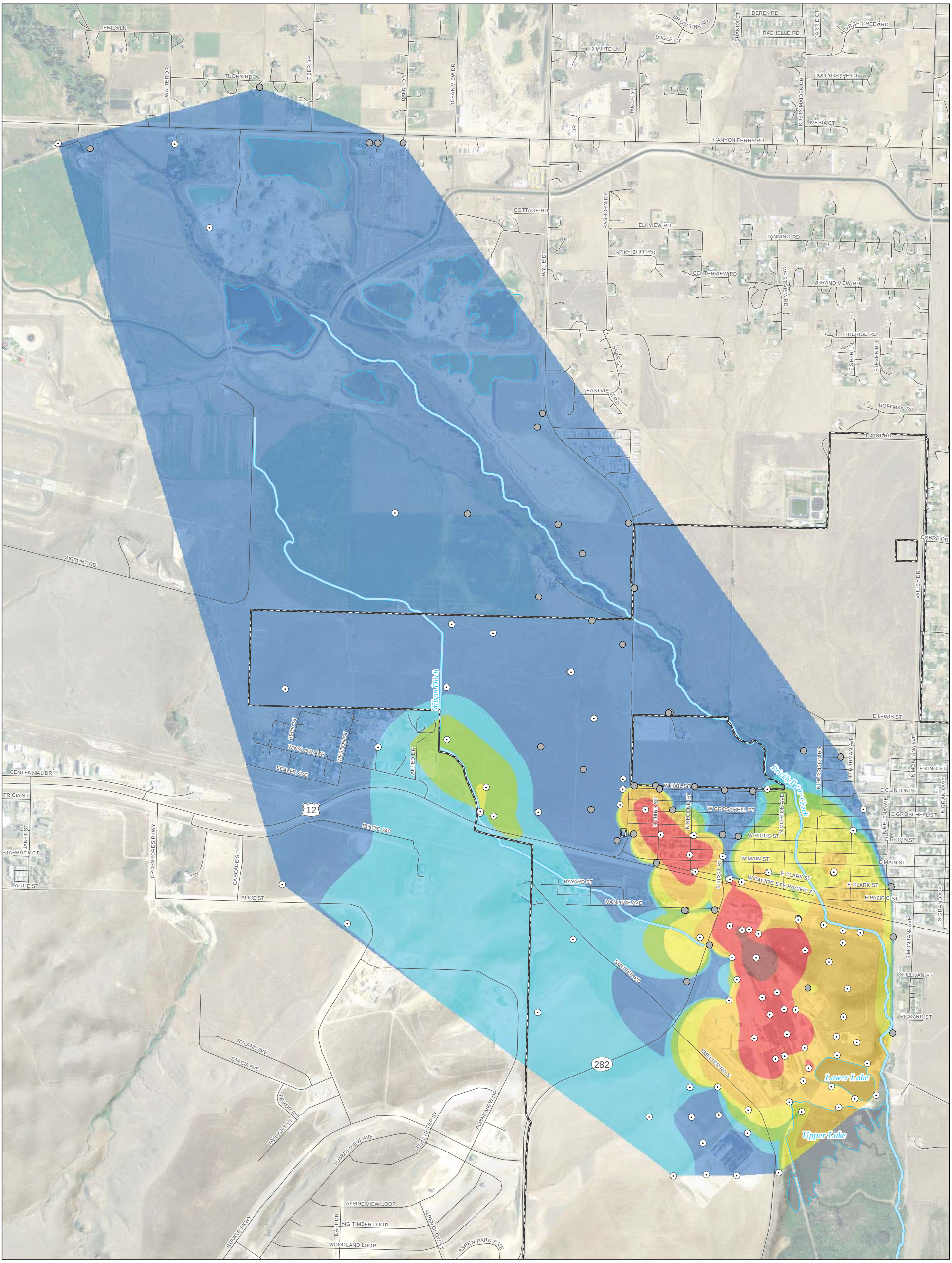
V:\10022\GIS\LOSA\Plant_Site_Soils.mxd

FIGURE 3-7
Soil Sampling Locations – Former Smelter Site
Interim Measures Work Plan–2012 Draft
East Helena, Montana

ES032612024219PDX 420947.11.J1.J0 Rv5 9-10-12 lh



LEGEND

Arsenic Concentrations (mg/L)

- >17
- >1.7 - 17
- >0.17 - 1.7
- >0.034 - 0.17
- >0.017 - 0.034
- >0.01 - 0.017
- < 0.01

Groundwater Monitoring Locations

- Detect
- Non-Detect

All Other Features

- East Helena City Limits
- Roads
- Surface Water Features

MAP NOTES:
Date: April 26, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

This figure was modified by CH2M HILL in September 2012.

FIGURE 3-8
Dissolved Arsenic Concentrations in Groundwater
October-December 2010
Interim Measures Work Plan–2012 Draft

Phase II RFI Report
East Helena, Montana

N

0 0.125 0.25 0.375
Miles

GSI Water Solutions, Inc.

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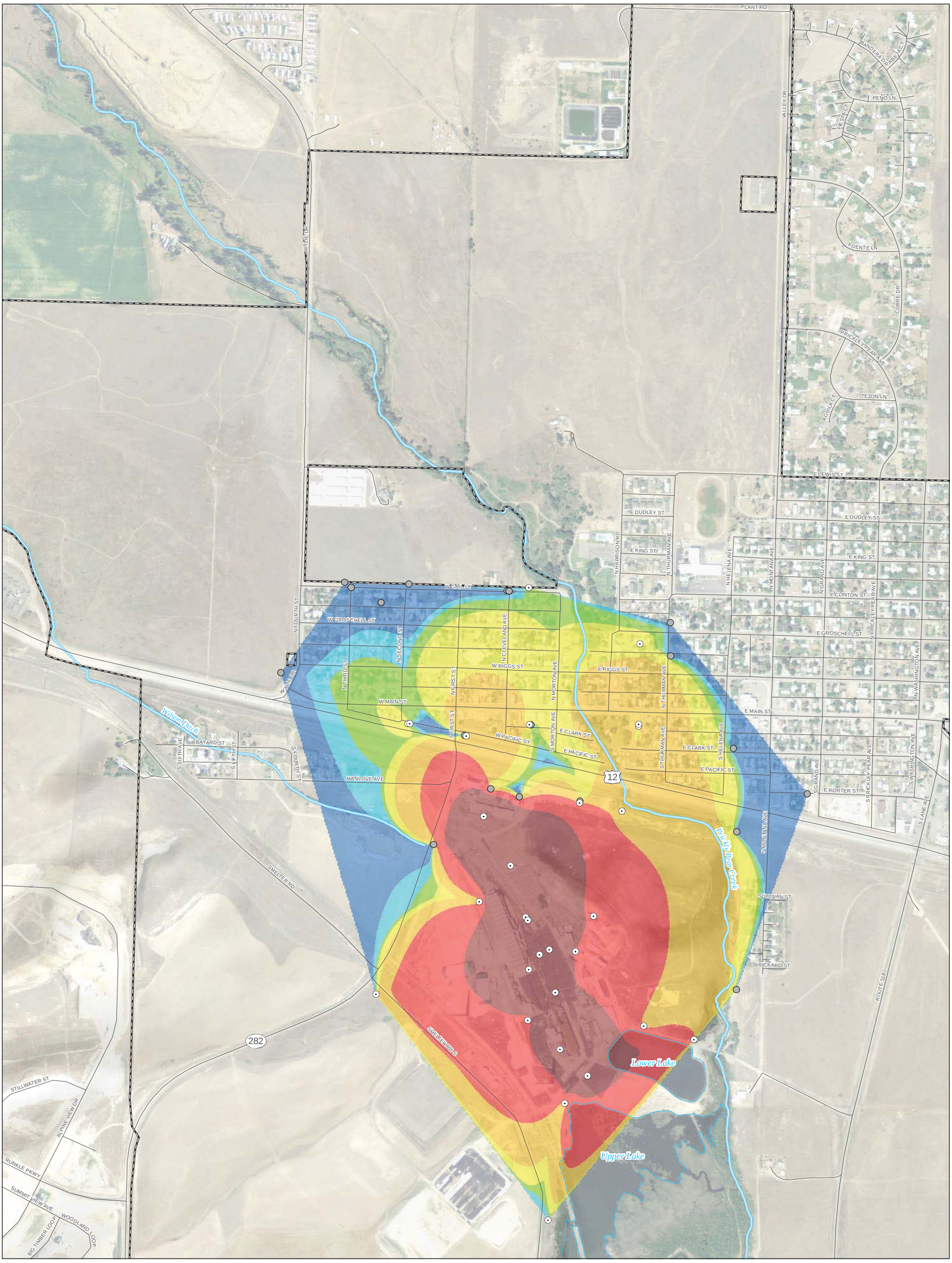

LEGEND

Arsenic Concentrations (mg/L)

- >17
- >1.7 - 17
- >0.17 - 1.7
- >0.034 - 0.17
- >0.017 - 0.034
- >0.01 - 0.017
- < 0.01

Groundwater Monitoring Locations

- Detect
- Non-Detect

All Other Features

- East Helena City Limits
- Roads
- Surface Water Features

MAP NOTES:
Date: April 26, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

This figure was modified by CH2M HILL in September 2012.

FIGURE 3-9
Dissolved Arsenic Concentrations in Groundwater
April-May 1988
Interim Measures Work Plan–2012 Draft
Phase II RFI Report
East Helena, Montana

N

0 400 800 1,200
Feet

GSI Water Solutions, Inc.

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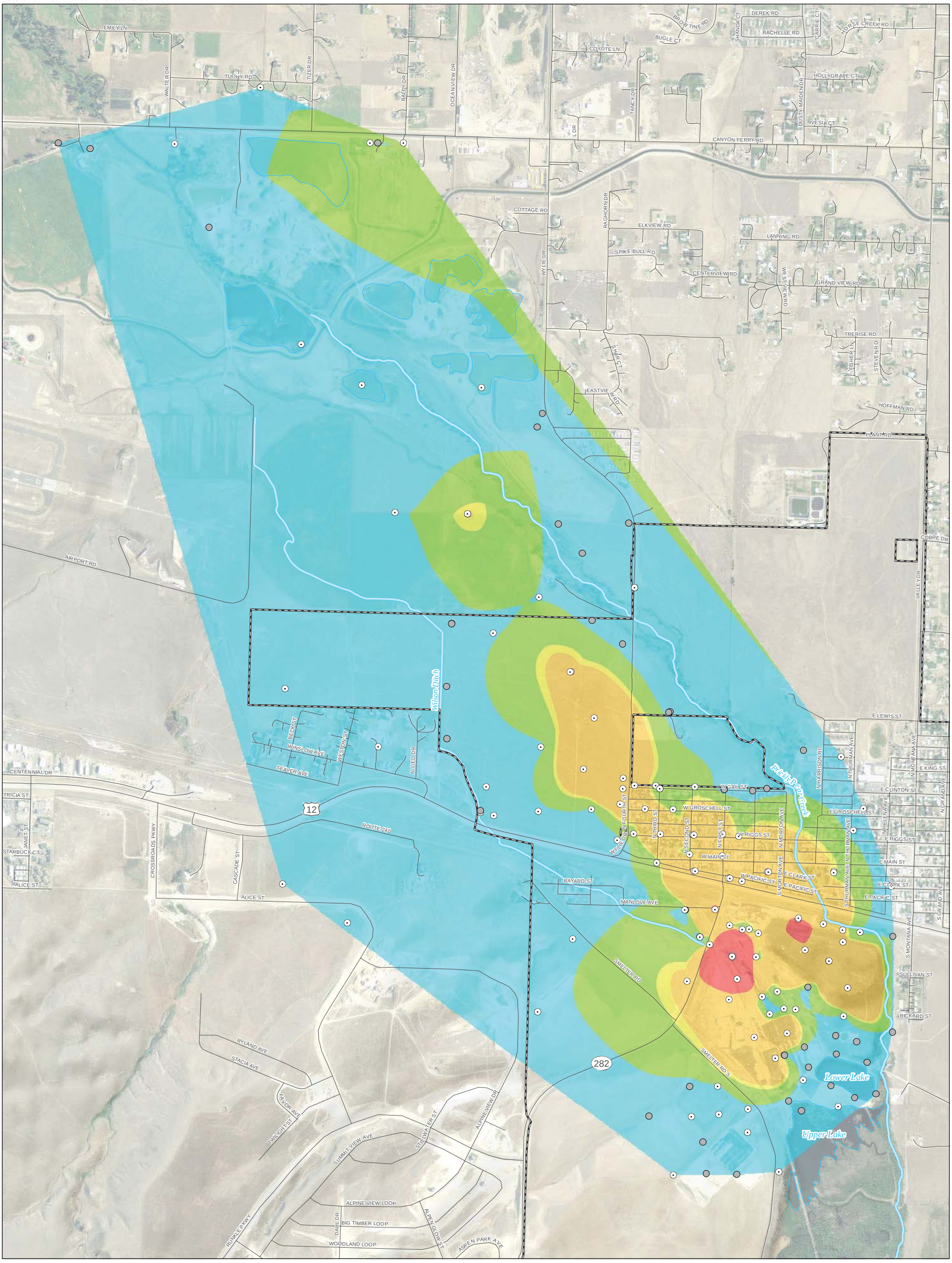

LEGEND

Selenium Concentrations (mg/L)

- >6
- >0.6 - 6
- >0.06 - 0.6
- >0.05 - 0.06
- >0.012 - 0.05
- >0.0006 - 0.012
- <0.0006

Groundwater Monitoring Locations

- Detect
- Non-Detect

Regional Groundwater Background Concentration for Selenium is 0.006

All Other Features

- East Helena City Limits
- Roads
- Surface Water Features

MAP NOTES:
Date: April 26, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

FIGURE 3-10
Dissolved Selenium Concentrations in Groundwater October-December 2010

Interim Measures Work Plan–2012 Draft

Phase II RFI Report
East Helena, Montana

N

0 0.125 0.25 0.375
Miles

GSI Water Solutions, Inc.

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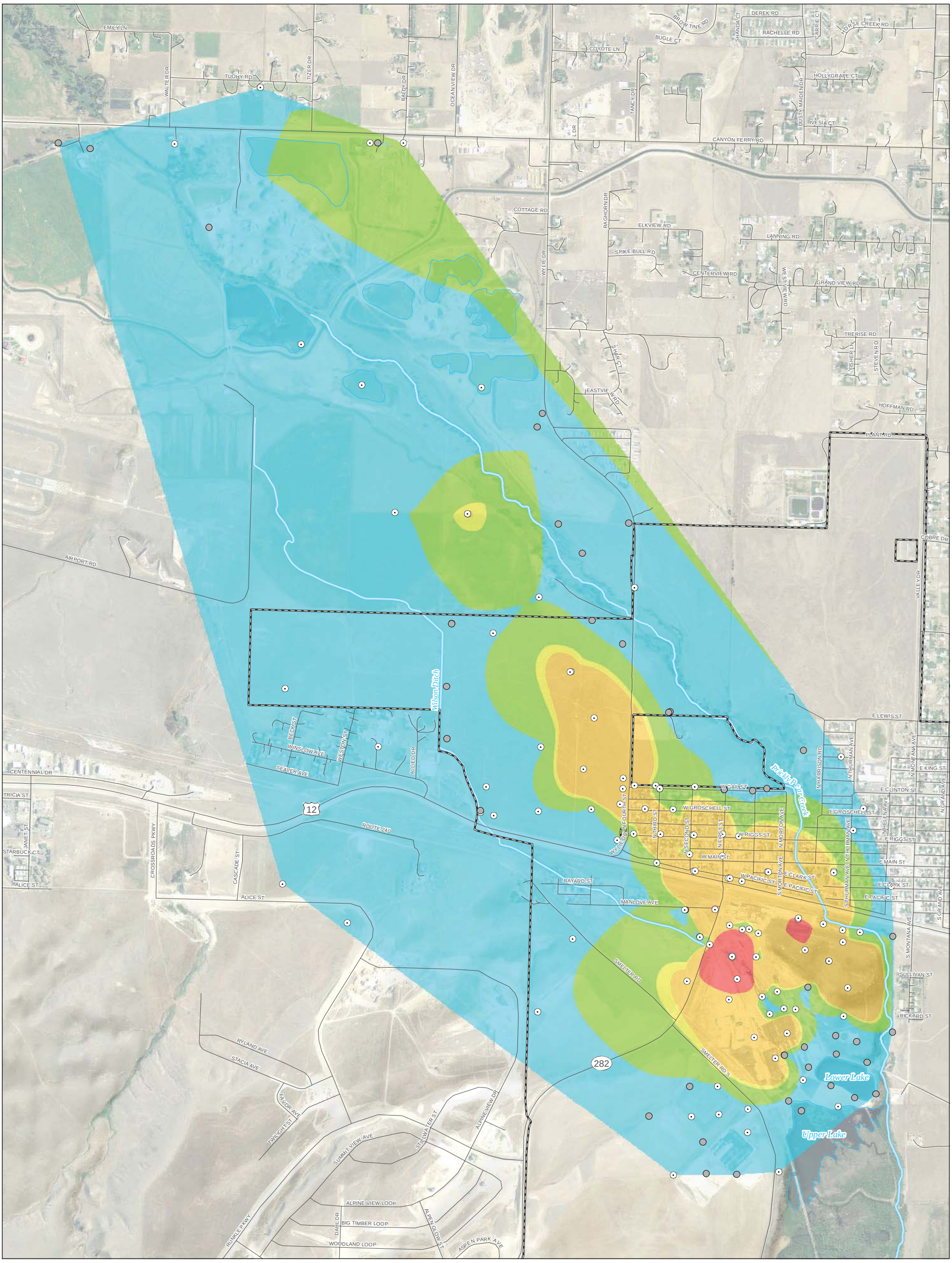

LEGEND

Selenium Concentrations (mg/L)

- >6
- >0.6 - 6
- >0.06 - 0.6
- >0.05 - 0.06
- >0.012 - 0.05
- >0.0006 - 0.012
- <0.0006

Groundwater Monitoring Locations

- Detect
- Non-Detect

Regional Groundwater Background Concentration for Selenium is 0.006

All Other Features

- East Helena City Limits
- Roads
- Surface Water Features

MAP NOTES:
Date: April 26, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

FIGURE 3-11
Dissolved Selenium Concentrations in Groundwater
April-May 2008
Interim Measures Work Plan–2012 Draft
Phase II RFI Report
East Helena, Montana

N

0 0.125 0.25 0.375
Miles

GSI Water Solutions, Inc.

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SECTION 4

Data Sufficiency

This section discusses the sufficiency of data for conceptual development of the IMs and design of the projects proposed for implementation in 2012. Information provided includes a brief summary of existing data, a list of identified data needs, and a discussion of plans for additional data collection.

4.1 Summary of Existing Data

A variety of data are needed to evaluate, design, and construct the work described in this IM Work Plan 2012. The current data collection status is summarized as follows:

- Climatology – Completed. Available from local sources.
- Topography – Completed. Aerial and ground survey work was completed by the Custodial Trust in 2011 to update site mapping.
- Hydrogeology – Ongoing. The draft Phase II RFI Report summarizes work conducted through 2010. Current groundwater conditions both on and offsite at the former Smelter site are monitored quarterly by the Custodial Trust. This work is part of ongoing groundwater characterization efforts being implemented by the Custodial Trust. The plan for collection of groundwater and surface water samples in 2012 is summarized in the *Draft 2012 Groundwater and Surface Water Field Sampling and Analysis Plan East Helena Facility* (FSAP) (Hydrometrics, April 2012).
- Soil lithology – Completed. Data are summarized in the draft Phase II RFI Report.
- Wetlands – Completed. Delineation is summarized in *East Helena Smelter RCRA Site, Draft Wetlands Assessment Data Summary Report,* PTS and MMI, November 2011.
- PPC Stream geomorphology – Completed. Data are summarized in the *Existing Conditions Stream Assessment Prickly Pear Creek, East Helena Smelter RCRA Site,* prepared for CH2M HILL by Applied Geomorphology Inc, PTS, and MMI, January 2012.
- South Plant Wildlife Survey – Completed. Results are summarized in the *Wildlife Resources Evaluation, East Helena Smelter RCRA Site,* CH2M HILL, November 2011.
- Stream flow – Completed. Data are available from local sources.
- Soil chemistry – Completed. Data are summarized in the draft Phase II RFI Report. Limited additional data may be needed in localized areas to support detailed engineering evaluation.
- Sediment chemistry – Completed. Data are summarized in the draft Phase II RFI Report. Limited additional data may be needed in Lower Lake and PPC upstream and downstream of Smelter Dam to support detailed engineering evaluation. These data needs are currently being evaluated.
- Groundwater chemistry – Ongoing. The draft Phase II RFI Report summarizes work conducted through 2010 and groundwater monitoring pursuant to the FSAP provides updated information on a quarterly basis.
- Stormwater flows and chemistry – Ongoing. Data are available from former Smelter site personnel operating with HDS water treatment plant.
- Building inventory – Partially completed. Additional data are needed to support detailed engineering (see discussion that follows).
- Utility types and locations – Partially completed. Additional data are needed to support detailed engineering (see discussion that follows).

- Structures – Partially completed. Engineering drawings available onsite will be reviewed during detailed engineering to determine if data are sufficient. No additional data collection recommended until drawing review is completed.
- Borrow sources and geotechnical data – Completed. Data are summarized in the draft Phase II RFI Report. Additional test pits were constructed on east tertiary bench in January 2012.

Limited additional data requirements for 2012 are summarized in Section 4.2.

4.2 Additional Data Requirements for 2012 Work

At present, only limited additional data needs have been identified for engineering and construction of the work identified in this IM Work Plan 2012. These data include the following:

- Asbestos surveys in buildings where this work has not been completed (this will be required in most of the remaining buildings)
- Sediment chemistry upstream of Smelter Dam
- Additional soil chemistry data on the east tertiary bench (may be required if existing data are insufficient to document condition of surface soil in the planned excavation area)
- Survey of utility locations on the east tertiary bench, including depth bgs for buried utilities

A schedule to collect these data in 2012 prior to engineering design will be prepared. Sediment samples will be collected in accordance with the Custodial Trust's existing Sampling and Analysis Plan and Quality Assurance Project Plan. Survey data will be collected by a licensed surveyor to support detailed engineering design.

Additional data will be developed to monitor and evaluate the performance of the IMs. Data from the Groundwater Flow, Fate, and Transport model, currently under development, will be used to inform IM performance evaluations, and specific IM performance monitoring plans will be developed.

SECTION 5

Engineering Design and Construction for Proposed 2012 Projects

This section summarizes design and construction activities associated with the work proposed for implementation in 2012. A detailed schedule for task implementation is provided in Section 8, Figure 8-2.

5.1 Demolition of Buildings and Infrastructure in the Lower Ore Storage Area (LOSA)

5.1.1 Building and Utility Demolition

Building and utility demolition activities proposed for 2012 in the LOSA focus on clearing the site of infrastructure that will prevent or restrict construction of the CAMU and the ET Cover System IM. The areas associated with the 2012 work are shown in Figure 1-1. This work will include implementation of measures necessary to protect the area exposed by demolition activities until the ET cover system is in place. The remaining buildings and infrastructure at the former Smelter site will be demolished in a future phase of work.

The buildings to be demolished in this initial phase of work include the following:

- Former OSHB
- Barnum coverall building
- Bailey coverall building
- Miscellaneous additional structures including the high-grade building, scale house, truck scale, and loading dock

The OSHB was used in the past for storage and blending of feedstock used in the smelting process. The building is a large precast concrete structure with an extensive concrete foundation. Decontamination of the OSHB was completed in accordance with the Consent Decree and approved by MDEQ in 2009. The building is currently vacant but contains an overhead bridge crane and miscellaneous other pieces of equipment.

The Barnum and Bailey coverall buildings were also cleaned in accordance with the Consent Decree and approved by MDEQ in 2009. These buildings consist of steel-framed structures with synthetic fabric exteriors. Framing steel in each building is attached at the perimeter to concrete foundations.

Structures in this area are expected to be removed to the ground surface; foundations will be left in place. Because the foundations will be left in place, temporary covers over the building footprints should be minimal. Usable materials remaining after demolition will be recycled, reused, properly disposed of in a suitable landfill, stockpiled as rubble, or crushed for use as backfill under the ET cover system. Options being considered for disposal of concrete rubble after demolition include crushing it for use as onsite fill, leaving it in place, or moving rubble to a nearby location for storage until it is capped under the ET cover system.

5.1.1.1 Engineering Design

Sitewide Building and Utility Demolition Plan. A sitewide building and utility demolition plan is being prepared. This document will provide a conceptual framework for demolition implementation. This plan will be developed to coordinate with phased installation of the ET cover system, implementation of the SPHC IM, construction of the proposed onsite CAMU, future soil removal interim actions, and long-term management of stormwater runoff from the site.

Components of the sitewide building and utility demolition plan may include a materials inventory (including asbestos-containing material/lead-based paint [ACM/LBP]), management plan for demolition materials, decommissioning steps and relocation requirements for existing utilities, consideration for utilities that have links

to offsite property usage, slag resale operations, and eventual decommissioning of the existing HDS water treatment plant.

Demolition Phase 1. Engineering drawings, technical specifications, and contract documents will be prepared in 2012 to enable Demolition Phase 1 activities to be let for bid. It is currently planned that one bid package will be prepared, for demolition of buildings, foundations (to ground surface), and miscellaneous structures. It is anticipated that for this work, a performance-type specification to demolish the existing structures and utilities will be prepared. The specification will allow flexibility for contractor-chosen means and methods to cost-effectively remove the structures and recycle or reuse materials.

5.1.1.2 Demolition Activities

Typical activities to be completed prior to the initiation of 2012 fieldwork are summarized below. Available information indicates that asbestos abatement has already been completed in these buildings. Prior to the start of construction, the contractor will confirm completion of abatement activities. If site inspections identify any remaining ACM, this material will be removed in accordance with applicable statutory requirements prior to the start of demolition activities.

Demolition Phase 1 construction is expected to begin with removal of the Barnum and Bailey buildings. Preliminary engineering evaluations have confirmed that the metal superstructure in each building has value either for the metal content or for reuse. The exterior fabric in each building is too weathered to be of use. Demolition bid documents for the Barnum and Bailey buildings will prescribe either recycling or reuse of the metal superstructures.

Concurrent with removal of the Barnum and Bailey buildings, the OSHB and nearby structures will be demolished. Specific demolition procedures will be chosen by the selected contractor. In general, it is expected that demolition of the OSHB will follow a top-down approach for each individual column line. Broken concrete will be removed and hauled directly to a material staging and processing area. At this location, salvageable material will be sized to meet the final disposition requirements. Salvageable materials will be stockpiled until they can be loaded into trucks or rail cars for transport to the recycling facility. Concrete rubble from the building is expected to be suitable for reuse as fill material beneath the ET cover system. Contractors will be given the opportunity to recycle or reuse as much of the building structure, such as steel framing, as is feasible.

Utilities used in the past to service these facilities will be decommissioned during Demolition Phase 1. Decisions regarding utility decommissioning will be made during engineering design and could include removal of rail spurs and ballast, electrical and natural gas lines, stormwater systems, decommissioned fuel storage tanks, and various pieces of equipment. Utility locates will be performed by the contractor. Existing utility drawings and underground utility information maintained by the Custodial Trust will be used to identify and locate as many underground utilities as possible.

5.1.2 Example Demolition Phase 1 Specifications

The following are example demolition specifications for work that the selected contractor will need to complete before the start of 2012 field activities:

- General information
- Site-Specific Health and Safety Plan (HSP)
- Hazardous Materials Abatement Plan
- Recyclable Material Plan
- Dust Control Plan
- National Emission Standards for Hazardous Air Pollutants (NESHAP) Permit
- Construction schedule
- Stormwater containment, run-off patterns, and water management
- Site security
- Administrative, staging, and decontamination facilities
- General construction permitting

- Preconstruction meeting
- Mobilization

5.1.2.1 General Information

The contractor will follow all applicable federal, state, and local laws and regulations. Additional precautions not listed in this section may be required. The contractor will be responsible for determining which laws and regulations apply to the work being performed, and for coordination and scheduling of all tasks with the Custodial Trusts engineering consultant. The Custodial Trust reserves the right to stop all work at the contractor's expense if the contractor does not meet either the obligations set forth in this IM Work Plan 2012 or the requirements set forth by the contractor in their approved plans.

5.1.2.2 Site-Specific Health and Safety Plan

The applicable, site-specific health and safety requirements and required compliance for contractors and their personnel working on the site are as follows:

- Site-specific HSP
- ACM regulations and site-specific requirements
- Universal Waste Management Plan
- Recycling requirements
- Dust Control Best Management Plans
- SWPPP
- Site Security
- Administration, Staging and Decontamination Facilities
- General Construction Permitting

5.2 Prefabricated Steel Bridge Deck Construction for Smelter Dam

Engineering for the new prefabricated bridge structure will be completed in 2012 as part of the SPHC IM. It is expected that engineering for this will include preparation of a performance specification for demolition of the existing bridge deck and the installation of a replacement prefabricated bridge structure. The specifications will document intended uses for the bridge, expected wheel loads and truck trips, and other information necessary for the provision of a fully functional bridge deck. The bridge structure will be designed for relocation to allow for vehicular access to the site after Smelter Dam is removed. Replacement of the bridge structure on Smelter Dam is intended to be completed in 2012. Construction of the replacement bridge is expected to be by conventional means. Because the existing foundations are planned to be reused to support the replacement bridge structure, it is anticipated that demolition and new construction will be conducted from the creek banks above the high-water level with adequate controls in place to prevent impact to PPC.

5.3 Relocation and Abandonment of Utilities East of Prickly Pear Creek

A preliminary *Utility Relocation Plan for PPC Realignment* was prepared for CH2M HILL by MMI and issued to the Custodial Trust on March 23, 2012. This plan is currently being updated to document recent communications made with each utility owner within the PPC temporary bypass and realignment construction area. While much work related to utility relocation and decommissioning is ongoing, the following summaries are provided for major utilities:

- Air Liquide is planning to decommission and demolish their existing facility by the end of October 2012.
- Northwestern Energy is in discussions with the Custodial Trust to relocate existing distribution and transmission lines to the south of the plant site.

- The City of East Helena and the Custodial Trust are working together to engineer and relocate an existing main water supply line that runs through the area, and to abandon a sewer line that served the former ASARCO housing site.
- The City of East Helena and the Custodial Trust are working together to develop plans for closure or abandonment of South Montana Avenue on Trust property south of the railroad crossing.

These utility relocations are shown on Figure 5-1.

UTILITIES LEGEND

- OVERHEAD POWER
- NATURAL GAS
- EAST HELENA WATER
- EAST HELENA SEWER
- COMMUNICATION
- FIBER OPTIC
- AIR

300 150 0 300
SCALE IN FEET

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APPR. BY: AKE
DATE: 3/2012

PRICKLY PEAR CREEK RELOCATION
EAST HELENA MONTANA

PROJECT NO. 2557.006

FIGURE NUMBER 5-1

Preliminary Utility Map - East Tertiary Bench

R:\2557\006\ACAD\Exhibits\Utilities fig 1.dwg Plotted by jerry chambers on May/30/2012

SECTION 6

Remediation Waste Management

This section describes the proposed approach for managing remediation waste associated with implementation of the proposed 2012 construction projects as well as implementation of the conceptually proposed IMs. All hazardous and nonhazardous remediation waste associated with cleanup activities for the Facility are also considered to be CAMU-eligible waste, and will be managed in accordance with applicable federal and state regulations, as well as the relevant RCRA policy and guidance.

6.1 Application of Area of Contamination Policy and CAMU Rule

USEPA has issued a series of regulations, policy, and guidance describing RCRA program options for managing waste generated during cleanup activities in a manner that is protective, practical, and expedites overall cleanup. One of the key rules, the CAMU rule, has been in use at the East Helena Facility since the late 1990s. In addition, the Area of Contamination (AOC) Policy, is also applicable to this site, and will be used together with the CAMU rule during implementation of the IMs, as well as future final remedy implementation.

The proposed AOC boundary shown in Figure 6-1 covers Parcels 16 and 19 (the former Smelter site operating area); the area of Parcel 15 containing CAMU 2, portions of Tito Park, Lower Lake, and Upper Lake; and Parcels 10, 11, 12, 17, 18, and 23. The proposed boundary, which meets the RCRA definition and intent of the AOC Policy, was established with consideration to the following:

- The proposed AOC covers all of the operating area (typically referred to as the former Smelter site) and a portion of what would be considered the East Helena "facility" under RCRA (40 *Code of Federal Regulations* [CFR] 260.10) as described previously. For the purpose of interpreting and applying RCRA regulations, policy, and guidance, the contiguous ASARCO properties defined in Paragraph 38 of the First Modification meet the definition of "facility" cited in 40 CFR 260.10:
  - All contiguous land, and structures, other appurtenances, and improvements on the land, used for treating, storing, or disposing of hazardous waste, or for managing hazardous secondary materials prior to reclamation. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).
  - For the purpose of implementing corrective action under 40 CFR 264.101 or 267.101, all contiguous property under the control of the owner or operator seeking a permit under Subtitle C of RCRA. This definition also applies to facilities implementing corrective action under RCRA Section 3008(h).
  - Notwithstanding paragraph (2) of 40 CFR 260.10 of this definition, a remediation waste management site is not a facility that is subject to 40 CFR 264.101, but is subject to corrective action requirements if the site is located within such a facility.
- The proposed AOC is an area of continuous contamination. Sampling results from investigations conducted over the last three decades clearly show that the proposed AOC boundary meets the preamble to the NCP's description of an AOC as an area with continuous contamination of varying amounts and types. The broad, continuous area of contamination originating from the former Smelter site was first delineated under CERCLA, and as can be seen in Figures 5-3 and 5-4 from the OU2 Record of Decision, the estimated soil lead contour of 1,000 mg/kg and soil arsenic contour of 100 mg/kg, respectively, indicate a very large area of continuous surface soil contamination that extends well beyond the limits of the former Smelter site and even beyond the proposed AOC boundary. Further, as can be seen in Section 6 of the draft Phase II RFI, more-recent sampling confirms the presence of constituents of concern (COCs) in surface and subsurface soil across the entire former Smelter site and in all locations sampled on adjacent parcels.

- This AOC boundary encompasses the areas where implementation of IMs and potential future final remedies are expected to include removal actions and the excavation of significant volumes of soil. Existing data indicate that some of these soils may be characteristically hazardous, and having the flexibility to consolidate them with like materials on the former Smelter site or other appropriate areas within the AOC will contribute to the protectiveness and cost-effectiveness of implementation.
- The proposed AOC boundary provides benefits to both IM and final corrective measures implementation in several ways, including the following:
  - The ability to consolidate certain hazardous remediation wastes on the former Smelter site will reduce the overall footprint of contamination on the CMS Properties as identified in the draft *Former ASARCO East Helena Facility Corrective Measures Study Work Plan* (CH2M HILL, 2011).
  - It will be protective because the consolidated hazardous remediation waste will be managed properly by both IMs (e.g., ET cover system) and the final remedies for the site (which are expected to include both engineered and institutional controls).
  - It will allow IMs and other corrective measures to be implemented more cost effectively by:
    - Simplifying the logistics and handling requirements for certain excavated materials
    - Reducing the amount of imported material needed to regrade portions of the former Smelter site
    - Reducing the amount of characterization sampling needed

The ability to consolidate hazardous remediation waste within the proposed AOC will also reserve CAMU capacity for the management and treatment (if needed) of other hazardous remediation waste that clearly should be segregated from site soils.

This IM Work Plan 2012 also proposes use of CAMUs to manage remediation waste consistent with practices at the Facility since the late 1990s. Three CAMUs were identified in ASARCO's 1997 CAMU application, and subsequently approved by USEPA. The Phase 1 CAMU had a design capacity of 105,000 yd^3, the Phase 2 CAMU design capacity was 70,000 yd^3 and the capacity of the third CAMU was not designated. ASARCO's application indicated that the three CAMUs would be located in an area to the southwest of the operating area. As shown in Figure 6-1, CAMUs 1 and 2 were constructed on Parcel 15 and the southwest corner of Parcel 19, and CAMU 3 will either be constructed in the originally proposed location proximate to CAMU 1 and 2 or in the LOSA on the former Smelter site. The conceptual design of CAMU 3, and siting considerations, are currently underway and will be presented in a future IM Work Plan.

In accordance with the Final CAMU Rule, the remaining capacity of CAMU 2 and eventually the new CAMU 3 will be used to do the following:

- Receive CAMU-eligible waste from demolition, IM, and corrective measures activities conducted on the ASARCO properties
- Treat hazardous CAMU-eligible wastes, if necessary, and receive wastes generated during potential future removal actions that may be conducted to address wastes that migrated from the former Smelter site to offsite locations (e.g., slag that has been carried downstream of the former Smelter site by PPC)

6.2 IM Remediation Waste Management

The remediation wastes expected to be associated with implementation of the IM components are summarized in Table 6-1 and are generally described in the following paragraphs. Detailed work plans, as appropriate, for each of the components described as follows 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

IM Component	Remediation Waste	Disposition
PPC Temporary Bypass Construction	Soils[a]	Consolidation within Area of Contamination (AOC)
Realignment of PPC	Soils[a]	Consolidation within AOC
Utility Relocation	Debris, Soils	Consolidation within AOC and/or placed in CAMU 2
Building and Infrastructure Demolition	Debris[b]	Building debris that is not suitable for salvage or recycling will be evaluated for consolidation as fill within the AOC or placed in CAMU 3
	ACM, polychlorinated biphenyl (PCB) materials	If encountered, ACM -contaminated remediation waste will be either be placed in the CAMU or transported to an appropriately permitted offsite facility for disposal. Remediation waste containing PCBs will be transported to an appropriately permitted offsite facility for disposal.
Construction of ET Cover System Phase 1	Soils	Movement of soils during grading activities will occur within the AOC and are therefore considered consolidation under the AOC policy

[a] Existing data in this area are limited, but indicate the presence of site-related constituents of potential concern in surface and subsurface soils at concentrations that indicate the material may be characteristically hazardous.
[b] Debris is expected to be primarily concrete and steel from the Ore Storage and Handling Building and Barnum and Bailey buildings.

6.2.1 2012 Utility Relocation and Smelter Dam Prefabricated Steel Deck Construction

As previously noted, SPHC IM work proposed for 2012 consists only of utility relocation and construction of the prefabricated steel bridge structure over Smelter Dam and all work will be done within the footprint of the AOC. Soils that may be excavated as part of this work will either be returned to their trenches as backfill or consolidated in a more-protective location within the AOC itself. In the event that unusual materials or substances are encountered during the implementation of this, or any other, work, it will either be sampled to identify the material and make an appropriately protective management decision, or it will be placed in the CAMU.

6.2.2 PPC Temporary Bypass

Construction of the temporary bypass for PPC is estimated to require the excavation of over 250,000 yd^3 of soil, some of which may be considered characteristically hazardous waste based on the concentrations of site-related COPCs. Detailed soil and remediation waste management plans will be prepared as part of final design for the IMs, and will include testing to determine appropriate and protective reuse or disposition of excavated materials. Final design plans will include the following:

- Physical screening will be conducted to segregate material by particle size. Rocks and cobbles would be used for channel stabilization.
- Sampling and analyses will be conducted to identify soil geotechnical properties, as well as COC concentrations.
  - Stockpiles will be sampled for COPCs, and decisions regarding reuse or consolidation will be made based on the results. For example, soils with concentrations of COPCs exceeding appropriate media cleanup standards will not be used as growth media for the ET cover because they could come in contact with human and ecological receptors and stormwater.
  - Materials with low hydraulic conductivity will be stockpiled for use in the low permeability barrier currently contemplated for the northeasterly perimeter of Lower Lake.
  - Soils with sufficient organic content will be stockpiled for use as growth media for the ET cover.
- Protocols for stockpiling, transportation, and dust suppression to minimize potential contaminant migration during construction will be specified during final design.

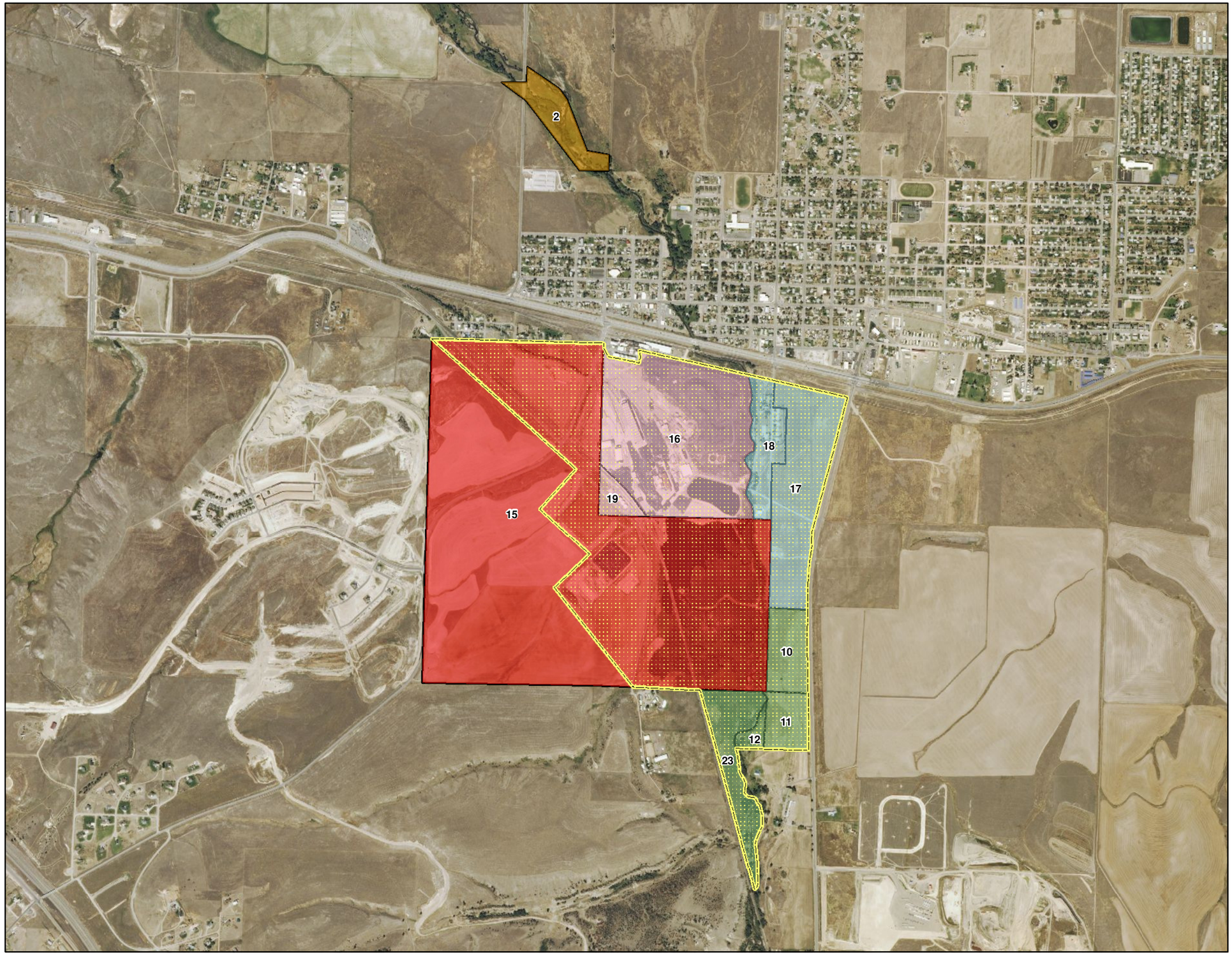
6.2.3 PPC Realignment

The material and remediation waste management plans described previously for the PPC bypass construction will also be used for the creek realignment work with appropriate additions and/or modifications. Materials that are excavated during construction of the new channel will be stockpiled and sampled as appropriate to inform final disposition. It is expected that these soils will be suitable for use as slope stabilization material for the easterly side of the slag pile and as backfill for the former creek channel after the creek is flowing in the new channel. Slag that may be encountered (given the proximity of the northerly realignment section to the slag pile) will be consolidated within the AOC on the slag pile. All of these activities will be conducted within the AOC boundary.

6.2.4 Building and Infrastructure Demolition and Utility Relocation

Infrastructure and building demolition for 2012 is focused in the LOSA in preparation for construction of the ET Cover System. Remediation waste management associated with this work is summarized as follows:

- Consistent with previous demolition work conducted at the site, demolition contracts will be developed to encourage the appropriate beneficial reuse of debris and materials. Contracts will include requirements that contractors develop Recyclable Material Plans to describe how they will properly handle any materials believed to have salvage or recycle value.
- Concrete rubble and debris from the OSHB will be evaluated for use as onsite fill. The interior of the OSHB was pressure-washed and decontaminated in 2009 by ASARCO and has been inactive since that time. Given that this work will be performed within the footprint of the AOC, concrete rubble and debris can be stockpiled, consolidated, and used as appropriate for fill below the ET cover.
- Excavation of soils may be necessary as part of the utility/infrastructure work. Because all of the utility relocation work is being done within the footprint of the AOC, soils that are excavated will be temporarily stockpiled adjacent to the work area and then placed back in the excavation as fill.



LEGEND

- Portions of Parcel 2 near Prickly Pear Creek
- Parcel 15
- Parcels 16 and 19
- Parcels 17 and 18
- Parcels 10, 11, 12, and 23
- Proposed AOC Boundary

N

0 750 1,500
Feet

Figure 6-1
Proposed Area of Contamination Boundary
Interim Measures Work Plan–2012 Draft
East Helena, Montana

CH2MHILL

SECTION 7

Required Permits

This section identifies the federal, state, and local permit and licensing measures likely to be required before implementation of the SPHC IM can occur. Initial agency contacts have been made. The necessary permits, data collection efforts, timeframes, and agency fees are described. Because the floodplain administrator is local and affiliated with the City of East Helena, the floodplain permit and associated review by the Federal Emergency Management Agency (FEMA) and coordination with FEMA's counterparts within the State of Montana are discussed in the local permit section of this document.

Implementation of the construction projects proposed for 2012, and the ET Cover System and Source Removal IMs, are not anticipated to require permits. If the resulting changes in stormwater management at the site affect HDS plant operations as expected, the Montana Pollutant Discharge Elimination System (MPDES) permit under which treated stormwater is discharged will be reevaluated and notifications and modifications will be made as necessary.

7.1 Federal Permits

The following permits administered by federal agencies have been identified as necessary for completion of the SPHC IM.

7.1.1 Federal Clean Water Act, Section 404 Permit

Activities undertaken on a RCRA site as approved or required by USEPA are required to obtain permits under Section 404 of the Clean Water Act (CWA). The CWA Section 404 regulates discharge of dredged or fill material into waters of the United States, including wetlands. The program, regulated by the U.S. Army Corps of Engineers (USACE), strives for no-net-loss of wetland areas. Section 404 regulations require a preconstruction notification (application) and issuance of a permit before impact activities, unless the project is exempt from Section 404 regulation. Discussions with USACE staff to-date indicate that based on the particular specific activities, a general Nationwide Permit (NWP) would be required.

Before submitting an application, a wetland survey is carried out to determine the jurisdictional wetland boundaries and areas subject to regulation. This survey was completed in October 2011 and findings summarized in a Data Summary Report. Additionally, the USACE must consider impacts to wetland functions and values when evaluating Section 404 applications. Functions and values have been assessed using the *Montana Wetland Assessment Method* and are discussed in the Data Summary Report, as well.

7.1.1.1 Nationwide Permits

Two NWPs that would likely be issued for the project are Aquatic Habitat Restoration, Establishment, and Enhancement Activities (NWP 27) and Cleanup of Hazardous and Toxic Waste (NWP 38), summarized as follows:

- **Aquatic Habitat Restoration, Establishment, and Enhancement Activities (NWP 27)**. NWP 27 regulates activities in waters of the United States associated with the restoration, enhancement, and establishment of wetlands and riparian areas and the restoration and enhancement of streams and other open waters, provided those activities result in net increases in aquatic resource functions. To the extent that a USACE permit is required, activities authorized by NWP 27 include, but are not limited to, the removal of accumulated sediments; the enhancement, restoration, or establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks; and activities needed to reestablish vegetation, including plowing or discing for seed bed preparation and the planting of appropriate wetland species.
- **Cleanup of Hazardous and Toxic Waste (NWP 38)**. NWP 38 applies to court-ordered remedial action plans or related settlement activities required to effect the containment, stabilization, or removal of hazardous or

toxic waste materials. This NWP does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste.

7.1.1.2 Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies

Within Montana, a *Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies* would be submitted to USACE, and the agency would determine the specific NWPs that would apply. Based on initial conversations with the regulator's project manager, different phases of the project would require different applications. For example, the temporary diversion—dam and sediment removal—stream reach reconstruction would be the first application. The relocation of the present stream course away from the slag pile would require a second application. Any required mitigation could be a third application. Activities related to removal of impoundments would be evaluated and placed into permitted activities associated with the first or second applications, or conducted under an additional application if the activities are to be performed independent of diversion dam/ sediment removal or relocation of PPC.

Montana Stream Mitigation Procedure. *Montana Stream Mitigation Procedure* (MTSMP), recently developed by the Montana Office of USACE, is used to quantify the adverse impacts (debits) and the acceptable compensatory mitigation (credits) in projects having more than minimal impacts to a stream. In the case of the proposed stream reach reconstruction, from the irrigation diversion to the dam, MTSMP would likely afford the project an increase in credits necessary to offset other impacts. This procedure also requires consultation with Montana Fish, Wildlife, and Parks regarding potential impacts to fish habit.

Schedule. The Joint Application covers the necessary provisions in General Condition 27. USACE has up to 30 days to make initial review, and once the application is deemed complete, the agency has 45 days prior to issuing the permit(s). Wetland losses greater than 0.1 acre would require mitigation. The mitigation could come in the form of a developed wetland or as increased functions and values (any losses would not be measureable until after the removal of the sediments and dam).

7.1.2 Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Threatened, Endangered, and Candidate Species and Critical Habitat Consultation

The U.S. Fish and Wildlife Service (USFWS) staff has been contacted regarding the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Threatened, Endangered, and Candidate Species and Critical Habitat have been evaluated as part of the wetland survey and wildlife habitat and are not known to be present on the project. METG is also in the process of evaluating their obligations to USFWS under the Consent Decree and Settlement Agreements (and associated modifications) governing this site. Until these determinations are available and additional information regarding specific impacts has been developed, a determination of the requirements by the USFWS under these acts is not possible. The potential requirements are expected to be manageable.

7.2 State Permits

The following permits administered by the State of Montana have been identified as necessary for completion of the SPHC IM.

7.2.1 Open-Cut Mining Permit

Mining or moving greater than 10,000 yd^3 of material will require coordination with MDEQ Open-Cut Mining Section and the Lewis and Clark County Weed District. Permit preparation and field investigations are required for this permit. Field activities are necessary to support both a weed management plan and the mining plans required for the MDEQ Open Cut Mining Permit. Field investigation for the mining plan includes identification of soil types, soil depths, site access, haul roads, surface water locations, stockpile locations, and drainage as they relate to the mining activity. The field investigation requires test pits to be constructed for verification of soil depths and depth to limiting layers such as shallow bedrock or groundwater. Permit preparation benefits greatly from a

preapplication meeting with MDEQ to facilitate these field activities, preparing an Open-Cut Mining Permit application, and determining bonding requirement calculations. Bonding for the project will be the responsibility of the owner.

7.2.2 Short-Term Water Quality Standard for Turbidity (318 Authorization)

Any entity initiating construction activity that would cause unavoidable, short-term, or temporary violations of state surface water quality standards for turbidity must have 318 Authorization from MDEQ. The purpose of the law is to allow short-term water quality turbidity associated with construction activities, while protecting water quality.

The Authorization is made based on a recommendation by Fish Wildlife and Parks (FWP) following their review of the 310 Permit application. No formal application process is involved. However, MDEQ could stipulate project actions for approval.

7.2.3 Montana Water Use Act (Water Right Permit and Change Authorization)

Sixteen water rights for four different owners are legally tied to the Wilson Ditch Headgate. The Point of Diversion (POD) for these rights could be amended to a new headgate structure on PPC using the replacement POD form. Each of the parties would be required to file a new form. As a result of moving the headgate above or below other users' PODs and the original POD, a waiver is required from each water right holder on the intervening POD. Because FWP owns a water reservation on PPC, a waiver for each change from FWP to file with the replacement form would be required. This scenario would not require a Water Rights Change application. A permanent diversion of PPC would require this process to take place one time, and a temporary diversion would require two changes to the POD; one to change it initially and one to change it back.

7.2.4 Montana Pollutant Discharge Elimination System Permits

The goal of the MPDES program is to control point source discharges of wastewater such that water quality in the receiving streams is protected. METG holds the following two MPDES permits: (1) an individual permit (MT0030147) that provides authorization to discharge treated stormwater under the MPDES program from the wastewater treatment plant to an outfall on Lower Lake and (2) authorization under the General Permit for Storm Water Discharges associated with industrial activity (MT-R000072).

In addition to these two permits, the possibility of dewatering Lower Lake and thus needing to relocate a discharge outfall could potentially lead to two additional permits and amending the existing permits within the MPDES program. The two additional permits that may be required depending on scope and scale of project activities include (1) MPDES Construction Dewatering General Permit (MTG070000) and (2) Storm Water General Permit for Construction Activity (MTR 100000). Details on existing permits, potential permit amendments, and potential new permits follow.

7.2.4.1 Evaluation of the Existing MPDES Individual Permit MT0030147

METG currently holds an MPDES Minor Industrial Individual Permit No: MT0030147 for authorization to discharge under the MPDES program. This individual permit regulates wastewater discharges from point sources that do not fall under the guidelines of General Permits. Individual permits undergo a more rigorous process and address specific conditions of the facility or activity. This permit allows for the discharge of treated stormwater runoff to an outfall located on Lower Lake. The current permit is valid until July 31, 2015. Modifications to this permit may be necessary if the outfall location moved as a result of the dewatering and excavation activities that may take place on Lower Lake. As a part of the more-rigorous nature of individual permit, a public comment process may be required to change the outfall location. This permit will need to be modified on a temporary basis but ultimately eliminated once the industrial site stormwater collection and treatment facility is replaced with a sitewide ET cap.

7.2.4.2 Modification of Existing MPDES Industrial Activity Permit MTR000072

METG currently holds a MPDES General Permit for Industrial Activity. Discussions with Brian Heckenberger, MDEQ Water Protection Bureau staff, revealed that this General Permit was required in addition to the MPDES Individual

Permit (MT0030147) because of the exposure of industrial materials (slag piles) to rain, snow, snowmelt, and/or runoff. When this permit is renewed, it will require an updated and revised SWPPP that meets the stated requirements.

7.2.4.3 MPDES Construction Dewatering Permit MTG070000

The purpose of the MPDES Construction Dewatering General Permit (CDGP) is to regulate the discharge of wastewater from dewatering surface water from construction sites in accordance with effluent limitations, monitoring requirements and other conditions. Effluent characteristics (water quality data less than 1 year old) must be provided as a part of the application for coverage under this permit.

7.2.4.4 MPDES Construction Activity Stormwater General Permit MTR100000

Construction activity that results in the "disturbance" of equal to or greater than one acre of total land area will need to obtain this permit coverage. Obtaining coverage under this permit would require preparation of a Notice of Intent and a SWPPP.

7.2.5 Montana Dam Safety Act

The following two activities are necessary to complete this activity: (1) contacting the Montana Department of Natural Resources and Conservation (DNRC) and requesting they perform a hazard evaluation and (2) a construction permit to work on, around, or remove Smelter Dam, if required.

7.2.5.1 Downstream Hazard Evaluation

The purpose of this evaluation will be to determine if the dam is a high-hazard dam (indicates a potential for loss of life). If the dam is not determined by the DNRC to be high hazard, no dam safety permits are required.

7.2.5.2 Dam Construction Permit

If the dam is determined to be high hazard, a construction permit issued by DNRC's Dam Safety Program will be required to remove or perform construction on the impoundment.

7.2.5.3 Operating Permit

Depending on the length of time between hazard classification by DNRC and the construction demolition phase, a dam operating permit may be required, which would include annual owner inspections, 5-year engineer's inspection, and preparing Operating and Maintenance and Emergency Action Plans.

7.2.6 Montana Fish Wildlife and Parks – Fish Habitat Consultation

Agency consultation regarding potential impacts to fish habitat would be required. This would be covered under the Montana Stream Mitigation Procedure (Section 404 application) and the 310 Authorization.

7.3 Lewis and Clark County and City of East Helena Permits

The following permits administered by the local agencies and municipalities have been identified as necessary for completion of the SPHC IM.

7.3.1 Montana Natural Streambed and Land Preservation Act (310 Permit)

This permit is administered at the East Helena Site by the Lewis and Clark County Conservation District's Board of Supervisors. The Montana Natural Streambed and Land Preservation Act (310 Permit) applies to any nongovernmental entity proposing to work in or near a stream. The purpose of the permit is to minimize soil erosion and sedimentation and to protect and preserve streams.

7.3.2 Floodplain Permit

Any entity constructing within a designated 100-year floodplain must consult with Lewis and Clark County's floodplain coordinator. Since the East Helena Smelter property has been annexed by the City of East Helena, the Floodplain Coordinator is designated by the City of East Helena. The project is expected to impact a mapped

floodway and the 100-year floodplain of PPC. A *Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies* would be submitted to the City of East Helena Floodplain Coordinator. The East Helena Floodplain Coordinator has indicated that he will receive technical assistance from FEMA, the DNRC's Regional Engineer (Helena Region), and State Floodplain Engineer. Therefore, this permit activity will involve consultation and coordination with FEMA and their counterparts at the state level for technical review and consultation. Specific permitting activities required as part of this process include a CLOMR and a final LOMR for revisions and alterations to the PPC Floodplain within East Helena city limits.

7.3.2.1 FEMA Conditional Letter of Map Revision

Based on the information gathered from agencies present at the February 21, 2012, Agency Preapplication Scoping Meeting and subsequent conversations with FEMA agency staff, it is anticipated at this time that a CLOMR will be necessary before construction activities can begin within the floodplain. An application for CLOMR will be submitted to FEMA to update the effective Flood Insurance Rate Map (FIRM) mapping. Flood profiles will be used to determine the hydraulic evaluation and prepare floodplain maps submitted as a CLOMR report to FEMA. This information will also be used as part of the floodplain permit application to the City of East Helena for the proposed project since the local Floodplain Administrator has final authority on floodplain changes.

7.3.2.2 Letter of Map Revision

Once construction activities within the floodplain are completed, a final LOMR will be submitted to the floodplain administrator and FEMA to update the effective FIRM mapping. This will result in the approved revision to the FIRM map.

7.3.3 Other Local Permits

Discussions with the local Conservation District and the disaster, emergency services coordinator for Lewis and Clark County and the City of East Helena's Public Works Director indicate that no additional permits, including zoning, building, or demolition permits will be required to implement the South Plant Hydraulic Controls IM.

SECTION 8

Project Management and Schedule

This section provides an overview of project management activities and the proposed schedule for IM implementation. Organization and lines of communication, public participation, deliverables and reporting, and the schedule are described.

The Custodial Trust will manage all IM activities as part of the responsibilities and obligations set forth in the Settlement Agreement and First Modification. The Custodial Trust will communicate relevant information about IM task plans, results, and progress to USEPA, as Lead Agency, as well as to the federal and state beneficiaries of the Custodial Trust. Communications will be held on a frequent and timely basis, to review progress on the IMs, to solicit input from the beneficiaries, and to ensure that they are kept well informed of activities onsite.

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. The current overall Project Organization Chart and the lines of communication are shown in Figure 8-1. Leads for the anticipated consultant team for design and construction of IMs are summarized in Table 8-1.

TABLE 8-1
Interim Measure Consultant Leads

Name	Lead Contact	Description of Role
CH2M HILL	Scott Dethloff/PE: 406-457-5494	Project management and overall engineering lead for all disciplines, including civil, mechanical, structural, electrical, process, construction, and others
MMI	Mark Brooke/PE: 406-495-3469	Permit coordination and engineering design (all disciplines)
PTS	Joel Gerhart: 406-490-2530	Natural resources and engineering design (discipline roles TBD)
Hydrometrics	Bob Anderson: 406-443-4150	Hydrogeology and engineering design (discipline roles TBD)
Applied Geomorphology	Karin Boyd: 406-587-6352	Stream geomorphology
AMEC – Geomatrix	Cam Stringer: 406-542-0129	Groundwater flow and contaminant transport modeling
Others	TBD	TBD

8.2 Public Participation

Public involvement is a critical part of the overall cleanup process for the East Helena Site. General communication with the public will continue to follow the *Draft Community Relations Plan, Former ASARCO Smelter Facility, East Helena, Montana* (CRP) prepared by the Custodial Trust (May 2010), as well as the requirements of the First Modification to the 1998 Consent Decree. An informational meeting is planned to provide the community with an overview of the planned interim measures.

8.3 Deliverables and Reporting

As described in previous sections of this IM Work Plan 2012, typical deliverables associated with IMs are anticipated to include the following:

- Contract scopes of work and schedules
- Engineering technical reports and memoranda
- Modeling results (including PPC flow, ET cover system, and groundwater flow/contaminant transport)
- Permit application packages

- Detailed engineering designs (plans and specifications)
- Construction contract packages (drawings and specifications)
- Operation and maintenance plans
- 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:

- HSP for the East Helena Site
- Quality Assurance/Quality Control Plan
- Sampling and Analyses Plans

IMs progress will be summarized and included in the monthly progress reports.

8.4 Preliminary Interim Measure Implementation Schedule

8.4.1 Schedule Purpose and Structure

The three IMs include multiple construction projects that must be implemented in sequence for the overall IM to be successfully completed on time and on budget. The purpose of the IM schedule is to provide the preliminary contract organization, work sequences, and timelines that must be met for each IM construction project. Contracts have been determined primarily by work type being executed (similar work grouped) and the estimated durations are based on sequencing requirements for project execution, quantities derived from concept plan developments, and constraints resulting from site conditions and weather. Figure 8-2 provides a conceptual schedule for implementation of the combined interim measures. Table 8-2 provides a summary of key dates for the proposed 2012 implementation.

It should be noted that the schedule is considered a living document and will be **revised** on a regular basis as needed to reflect planned implementation requirements for each IM. 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 Trust, beneficiaries, and other stakeholders.

TABLE 8-2
Summary of Proposed 2012 Implementation Schedule
Updated on June 14, 2012

East Helena Facility Planning and Construction Activities	Start	End	Notes
2012 IM Work Plan			
Draft Internal Review	1-Mar-2012	30-Mar-2012	Includes SPHC and ET cover system.
Beneficiary Review and Comment	31-Mar-2012	14-May-2012	
Trust Revision	14-May-2012	14-Jun-2012	
USEPA Approval	14-Jun-2012	2-Jul-2012	
Public Comment	3-Jul-2012	16-Jul-2012	
Final IM Work Plan	16-Jul-2012	19-Sep-2012	
Contract 3—Building and Utility Demolition Phase 1			
Bidding and Award	14-Sep-2012	25-Oct-2012	Schedule may shift depending on Custodial Trust and Beneficiary approval.
Construction	26-Oct-2012	28-Feb-2013	

8.4.2 Implementation Activities Scheduled for 2012

This section provides a brief summary of some of the key IM engineering and construction activities planned to be completed by the Custodial Trust in 2012. A correlation of task to contract work package is added for clarity.

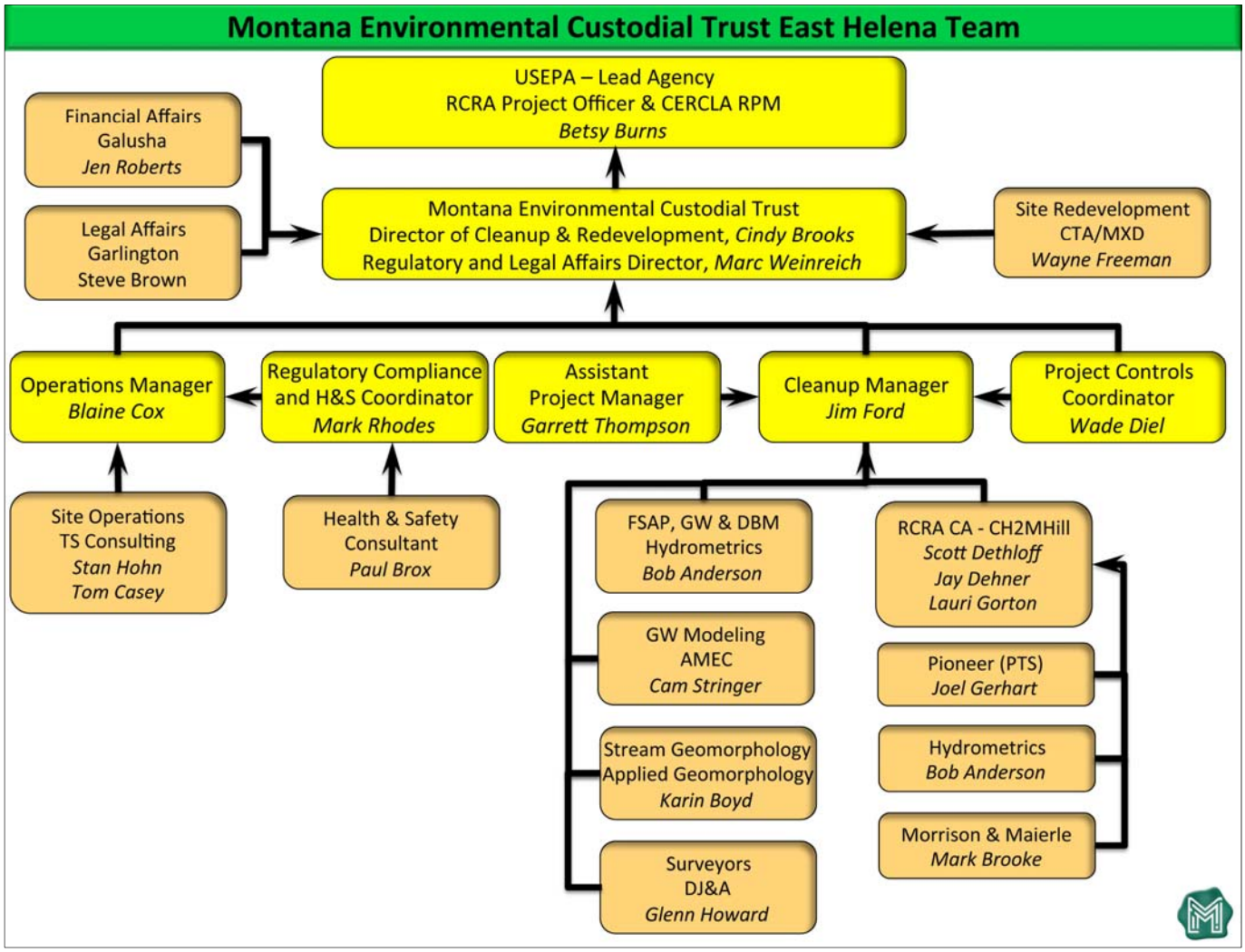
This summary is not all-inclusive, but focuses on critical path work activities that need to be completed to achieve the 2012 and 2013 plan. A brief description of each work activity follows.

- PPC Temporary Bypass Permitting
  - This work began in April 2012 and include preparation, submittal, review, and approval of Joint Application #1 for temporary bypass construction. Flood plain modeling will be included to evaluate flow channel hydraulics in low flow and high flow conditions. Consideration will be given to the ultimate permanent PPC realignment design.
- Contract 1—PPC Temporary Bypass
  - Concept Design: This activity has been underway since November 2011 and is essentially complete at this time.
  - Detailed Engineering: Anticipated to begin in 2012 to support submittal of Joint Application #1 and to enable contract documents to be issued for bidding in advanced of a planned March 2013 construction start date. Detailed engineering will include work for the PPC bypass, Upper Lake diversion structure, Smelter Dam access improvements (i.e., replacement bridge structure), and Upper Lake dewatering systems. Separate bid packages for the PPC bypass construction and the Smelter Dam bridge structure are planned to be issued.
  - Construction: Utility relocations on the East Tertiary Bench are planned for implementation in 2012 and 2013. No other construction related to the PPC temporary bypass is scheduled for 2012.
- Contract 2—Onsite CAMU
  - Conceptual Design: This activity is underway. Additional work is planned to begin in 2012 and will include communication with beneficiaries to the Custodial Trust in regards to CAMU location, liner, and sizing criteria.
  - Detailed Engineering: Anticipated to begin following conceptual design. To be completed in time to begin construction in spring 2013.
- Contract 3—Building and Utility Demolition
  - Planning: A Building/Utility Demolition Sequencing Plan is currently being prepared. This document will evaluate demolition activities on a site wide basis and recommend a long-term sequencing plan. The plan will be coordinated with other activities at the former Smelter site including stormwater management, ET cover construction, and possible future soil removal actions.
  - Detailed Engineering: Anticipated to begin in 2012. Will include OSHB, Barnum, and Bailey buildings, and other miscellaneous structures. Will also include detailed engineering to relocate or decommissioning utilities located on the East Tertiary Bench in the PPC temporary bypass and permanent realignment construction location.
  - Construction: Demolition and salvage activities for the OSHB, Barnum and Bailey buildings, other miscellaneous structures, and utility relocations to be completed in early 2013.
- Contract 4—Smelter Dam Demolition
  - Detailed Engineering: Schedule currently shows detailed design beginning in 2013 but demolition is not scheduled to be completed until 2014. Significant schedule float exists in this activity.

  - Construction: Smelter Dam bridge structure to be installed in time for start of the PPC temporary bypass construction in March 2013. This item is not explicitly shown on the current project schedule and will be added.

- Contract 5—Removal Actions (Tito Park and Lower Lake Sediment Removal)
  - Detailed Engineering: Schedule currently shows detailed design beginning in 2012 but removal actions are not currently scheduled to begin until 2014. Significant schedule float exists in this activity.
- Contract 6—LOSA ET Cover System
  - Cover Effectiveness Modeling: Activity is ongoing at this time. Modeling results are expected in 2012. This information will guide planning for source material evaluations and detailed engineering.
  - Detailed Engineering: Schedule currently shows detailed design for ET Cover System Phase 1 (in the LOSA) scheduled to be completed in 2013. ET Cover System Phase 1 construction is currently scheduled to start in 2014. Significant schedule float exists in this activity.
- Contract 7—PPC Realignment
  - Detailed Engineering: Anticipated to occur in 2012 to support preparation of Joint Application #2. Engineering design is expected to be available for bidding in 2013. Construction start is currently scheduled for fall of 2013.

FIGURE 8-1
Project Organization and Lines of Communication

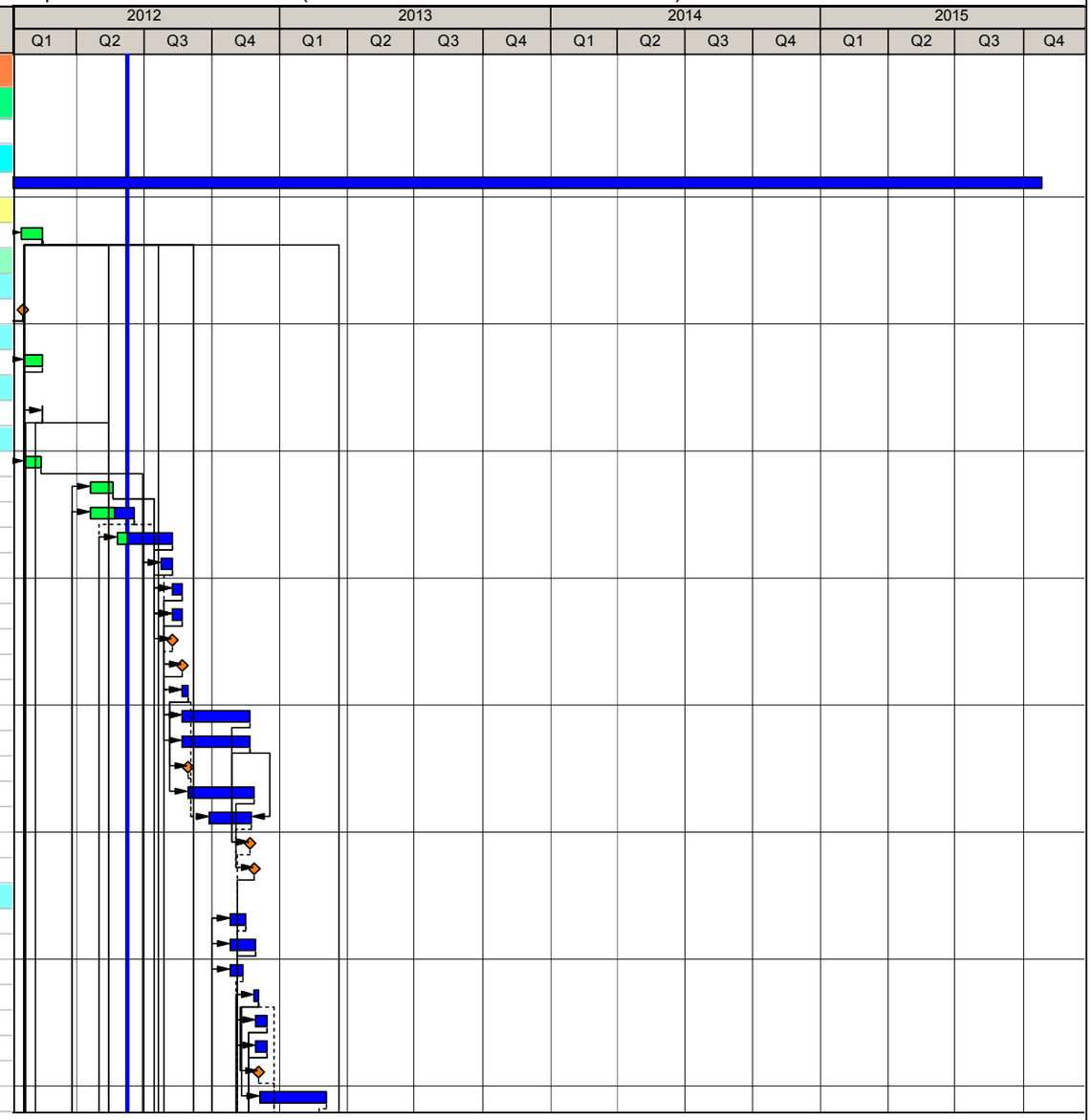


East Helena Smelter Site Cleanup

Figure 8-2 Summary Schedule

IM Workplan status as of 6/8/2012 (All other activities status as of 5/31/12)

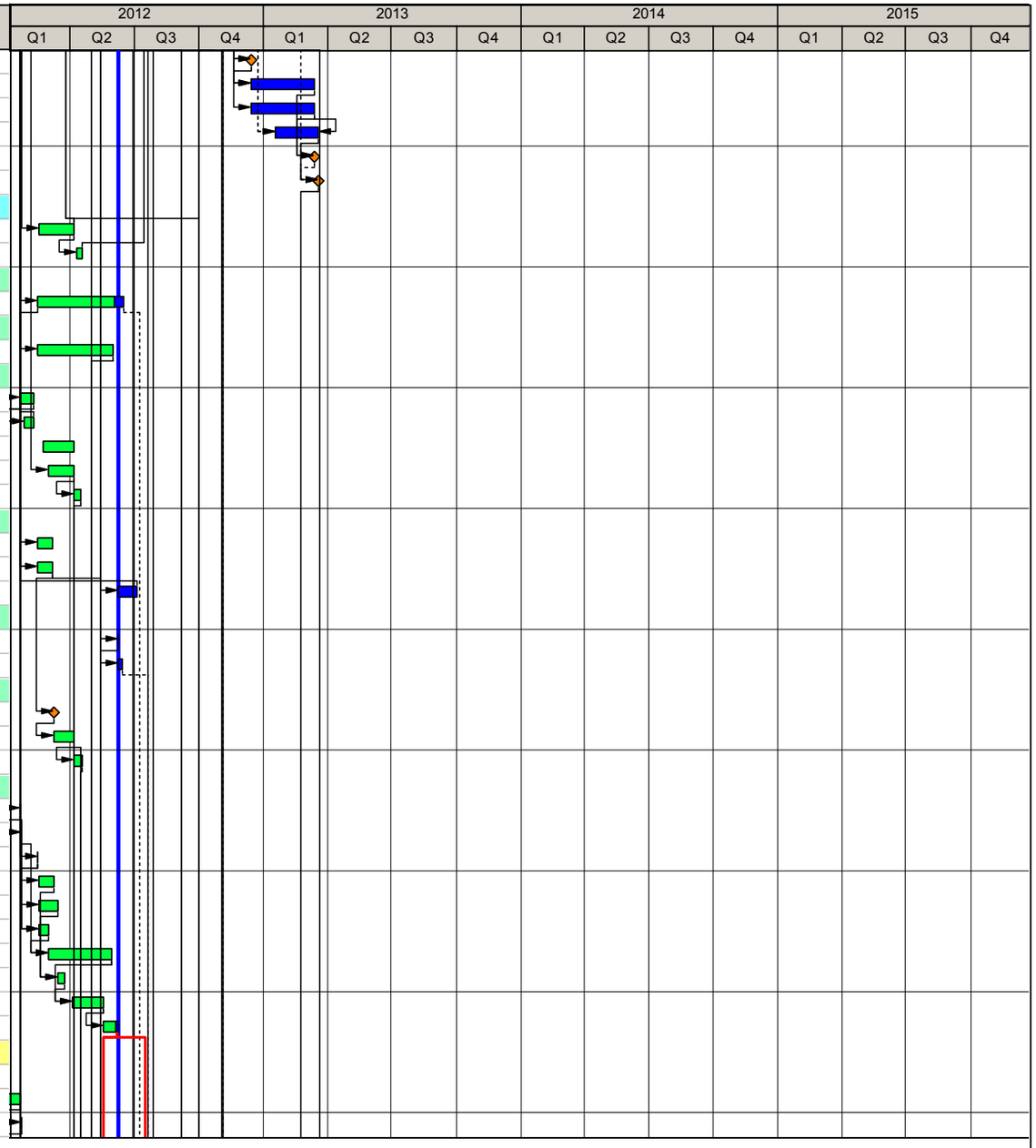
Activity ID	Activity Name	Original Duration	Remaining Duration	Physical % Complete	Start	Finish
East Helena Smelter Site IM Update (6/08/2012)		1171	882		06-Apr-11 A	26-Oct-15
Interim Measures (IMs)/CMS		1171	882		06-Apr-11 A	26-Oct-15
A3540	Project Start	0	0	100%	02-May-11 A	
South Plant Hydraulic Control		1090	882		23-Aug-11 A	26-Oct-15
EHIMCMS140	South Plant Hydraulic Control	1090	882	0%	23-Aug-11 A	26-Oct-15
Preliminary Work/RCRA/CMS		303	203		18-Jan-12 A	19-Mar-13
EHIMCMS260	2012 Initial Budget Approvals	32	0	100%	18-Jan-12 A	14-Feb-12 A
PPC Temporary Bypass and Realignment Permitting		303	203		19-Jan-12 A	19-Mar-13
Team Project Planning Meetings		0	0		19-Jan-12 A	19-Jan-12 A
A1030	Initial Meeting	0	0	100%		19-Jan-12 A
Concept Development/Documentation for Agency Kickoff		18	0		20-Jan-12 A	14-Feb-12 A
A1050	Concept Development Documentation	18	0	100%	20-Jan-12 A	14-Feb-12 A
Pre-Application Scoping Meeting		1	0		15-Feb-12 A	15-Feb-12 A
A1060	Scoping Meeting	1	0	100%	15-Feb-12 A	15-Feb-12 A
Joint Permit Application 1		223	123		20-Jan-12 A	27-Nov-12
J1070	Prepare Draft Joint Application Permit/Floodplain Permit	17	0	100%	20-Jan-12 A	13-Feb-12 A
J3401	FEMA Coordination	15	0	100%	20-Apr-12 A	21-May-12 A
J3402	HEC-RAS Modeling - Exisiting Condition	15	7	90%	20-Apr-12 A	18-Jun-12
J3405	HEC-RAS Model - Proposed Condition	15	12	20%	25-May-12 A	07-Aug-12
J3419	Draft JA 1	12	12	0%	23-Jul-12	07-Aug-12
J3403	Prepare CLOMR Application	10	10	0%	08-Aug-12	21-Aug-12
J3400	Prepare Floodplain Permit Application	10	10	0%	08-Aug-12	21-Aug-12
J3421	Draft JA 1 - M/S	0	0	0%	08-Aug-12	
J1081	Submit CLOMR and FP Applications - M/S	0	0	0%		21-Aug-12
J3420	Complete JA 1	5	5	0%	22-Aug-12	28-Aug-12
J3410	Agency Review CLOMR (FEMA)	65	65	0%	22-Aug-12	20-Nov-12
J3435	Agency Review FP Application (COEH)	65	65	0%	22-Aug-12	20-Nov-12
J1080	Submit Joint Application 1 -M/S	0	0	0%		28-Aug-12
J3431	Agency Review (L&C CD)	65	65	0%	29-Aug-12	27-Nov-12
J3430	Agency Review (ACE)	43	43	0%	26-Sep-12	23-Nov-12
J3441	Approval of FP Permit - M/S	0	0	0%		20-Nov-12
J3440	Approval of JA 1 - M/S	0	0	0%		27-Nov-12
Joint Permit Application 2		103	103		25-Oct-12	19-Mar-13
J4000	FEMA Coordination	15	15	0%	25-Oct-12	15-Nov-12
J4010	HEC-RAS Modeling	25	25	0%	25-Oct-12	29-Nov-12
J4070	Start JA 2	12	12	0%	25-Oct-12	12-Nov-12
J4080	Complete JA 2	5	5	0%	26-Nov-12	03-Dec-12
J4020	Prepare CLOMR Application	10	10	0%	29-Nov-12	13-Dec-12
J4030	Prepare Floodplain Permit Application	10	10	0%	29-Nov-12	13-Dec-12
J4090	Submit Joint Application 2 - M/S	0	0	0%		03-Dec-12
J4110	Agency Review (L&C CD)	65	65	0%	03-Dec-12	04-Mar-13



Date	Revision	Checked	Approved
8-June-12	Version 1.3		

Current Bar Labels % Complete Milestone

Activity ID	Activity Name	Original Duration	Remaining Duration	Physical % Complete	Start	Finish
J4040	Submit CLOMR and FP Applications - M/S	0	0	0%		13-Dec-12
J4050	Agency Review CLOMR (FEMA)	65	65	0%	13-Dec-12	14-Mar-13
J4060	Agency Review FP Application (COEH)	65	65	0%	13-Dec-12	14-Mar-13
J4100	Agency Review (ACE)	43	43	0%	17-Jan-13	19-Mar-13
J4120	Approval of FP Permit - M/S	0	0	0%		14-Mar-13
J4130	Approval of JA 2 - M/S	0	0	0%		19-Mar-13
Scope, Budget, and Schedule for Follow On Permitting Activities		51	0		16-Feb-12 A	17-Apr-12 A
A1090	Prepare Scope, Budget and Schedule for Follow On Activities	15	0	100%	16-Feb-12 A	06-Apr-12 A
A1091	Scope Approval (SOW 1)	5	0	100%	10-Apr-12 A	17-Apr-12 A
Hydrology and Geotechnical Data Collection		56	6		15-Feb-12 A	15-Jun-12
A1100	Collect Data	56	6	90%	15-Feb-12 A	15-Jun-12
Stream Geomorphology Engineering Support		17	0		15-Feb-12 A	31-May-12 A
A1110	Engineering Support Effort	17	0	100%	15-Feb-12 A	31-May-12 A
PPC Temporary Bypass Detailed Engineering SOW Preparation		70	0		20-Jan-12 A	16-Apr-12 A
A1120	Data Gathering and Review	5	0	100%	20-Jan-12 A	09-Feb-12 A
A1130	Concept Update	10	0	100%	27-Jan-12 A	09-Feb-12 A
A1150	Permitting Interface	13	0	100%	22-Feb-12 A	06-Apr-12 A
A1140	Design Scoping (SOW 2)	11	0	100%	01-Mar-12 A	06-Apr-12 A
A1141	Scope Approval (SOW 2)	5	0	100%	06-Apr-12 A	16-Apr-12 A
Onsite CAMU Support for Design Approach Approval		102	20		15-Feb-12 A	05-Jul-12
A1180	Concept Plan Update	10	0	100%	15-Feb-12 A	06-Mar-12 A
A1160	Alternative Development, Costing, and Regulatory Guidance	17	0	100%	15-Feb-12 A	06-Mar-12 A
A1170	Agency Decision on Repository Design Requirements	20	20	0%	08-Jun-12	05-Jul-12
PPC Permanent Realignment Detailed Engineering SOW Preparation		10	5		08-Jun-12	14-Jun-12
A5610	Prepare Scope (SOW 9)	10	0	0%	08-Jun-12	08-Jun-12
A5615	Approve Scope (SOW 9)	5	5	0%	08-Jun-12	14-Jun-12
Soil Repository Detailed Engineering SOW Preparation		35	0		09-Mar-12 A	17-Apr-12 A
A1190	Kickoff Meeting	0	0	100%	09-Mar-12 A	
A1200	Scope Preparation (SOW 3)	23	0	100%	09-Mar-12 A	06-Apr-12 A
A1201	Scope Approval (SOW 3)	5	0	100%	06-Apr-12 A	17-Apr-12 A
Building and Utility Demolition Conceptual Engineering		103	1		20-Jan-12 A	08-Jun-12
A1250	Initial Project Planning Meeting (Buildings and Utilities)	1	0	100%	20-Jan-12 A	20-Jan-12 A
A1260	Team Kickoff Meeting (Buildings and Utilities)	1	0	100%	23-Jan-12 A	23-Jan-12 A
A1210	Initial Project Planning Meeting (PPC Utilities)	1	0	100%	15-Feb-12 A	15-Feb-12 A
A1220	Utilities Contacts/Meetings (PPC Utilities)	16	0	100%	16-Feb-12 A	08-Mar-12 A
A1230	Data Evaluation (PPC Utilities)	20	0	100%	16-Feb-12 A	14-Mar-12 A
A1270	Data Evaluation (Buildings and Utilities)	10	0	100%	16-Feb-12 A	29-Feb-12 A
A1280	Bulding and Utilities Demolition Sequencing Concept Plan	20	0	100%	01-Mar-12 A	29-May-12 A
A1240	PPC Utilities Plan	9	0	100%	15-Mar-12 A	23-Mar-12 A
A1290	Scope, Budget, and Schedule for Follow-On Engineering (SO	5	0	100%	04-Apr-12 A	18-May-12 A
A1291	Scope Approval (SOW 4)	5	1	80%	18-May-12 A	08-Jun-12
ET Cover Selection and Initial Effectiveness Modeling		162	47		30-Dec-11 A	13-Aug-12
A1310	Initial Project Planning Meeting	1	0	100%	30-Dec-11 A	30-Dec-11 A
A1320	Data Gathering and Review	15	0	100%	02-Jan-12 A	20-Jan-12 A
A1330	Team Kickoff Meeting	1	0	100%	23-Jan-12 A	23-Jan-12 A

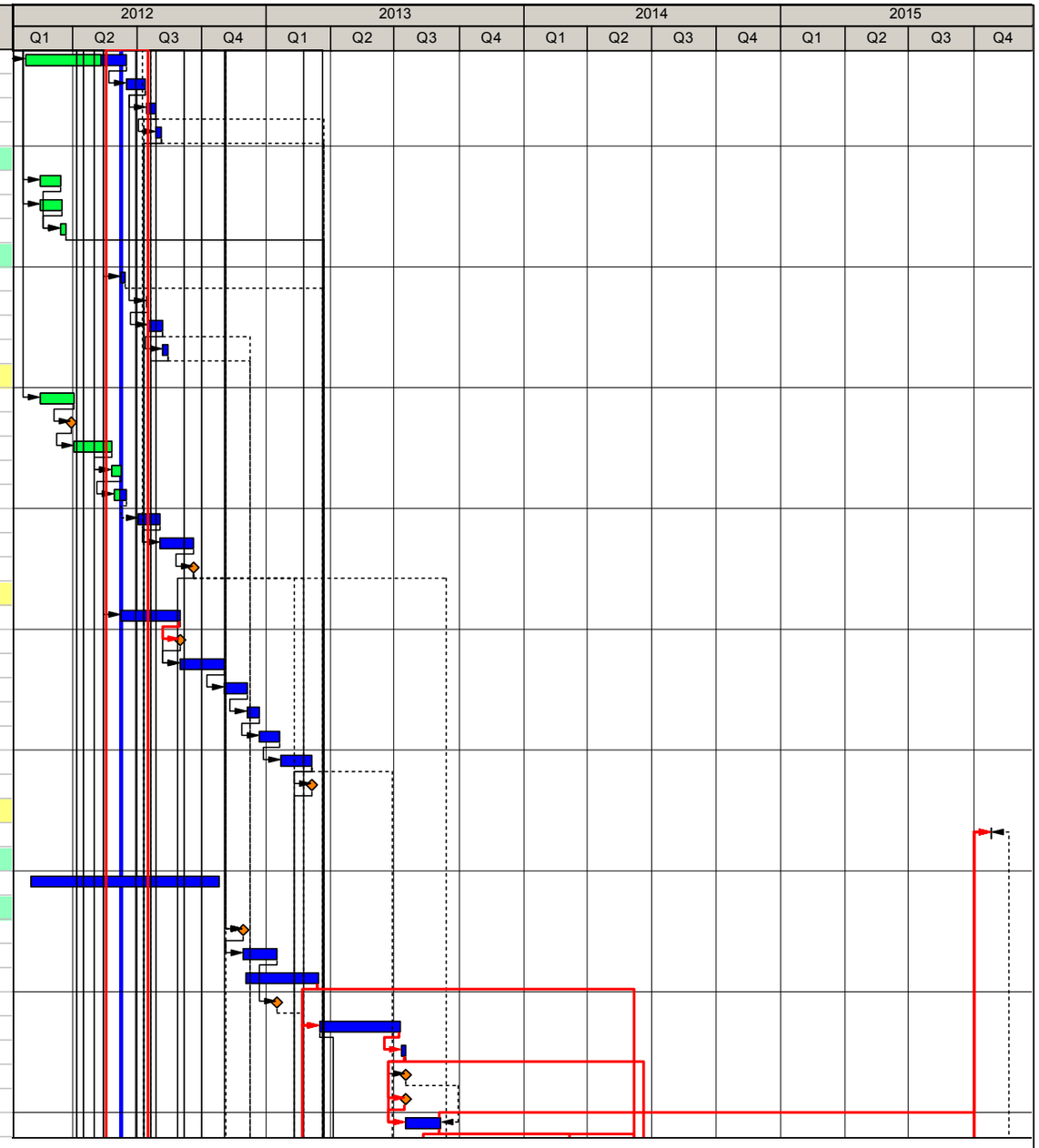


Date	Revision	Checked	Approved
8-June-12	Version 1.3		

Current Bar Labels % Complete

Milestone

Activity ID	Activity Name	Original Duration	Remaining Duration	Physical % Complete	Start	Finish
A1340	Data Evaluation and ET Cover Modeling	22	6	75%	24-Jan-12 A	15-Jun-12
A1350	ET Cover Effectiveness Modeling and Cover Selection Techn	20	20	0%	15-Jun-12	13-Jul-12
A1360	Scope, Budget, and Schedule for Follow-On Engineering (SO	10	10	0%	13-Jul-12	27-Jul-12
A1361	Scope Approval (SOW 6)	5	5	0%	27-Jul-12	03-Aug-12
ET Cover Concept Planning		35	0		15-Feb-12 A	23-Mar-12 A
A1370	Cover Grading and Phasing Evaluation	20	0	100%	15-Feb-12 A	13-Mar-12 A
A1380	Drainage Concepts	20	0	100%	15-Feb-12 A	16-Mar-12 A
A1390	ET Cover Grading Concept Plan	15	0	100%	14-Mar-12 A	23-Mar-12 A
ET Cover Detailed Engineering SOW Preparation		47	47		08-Jun-12	13-Aug-12
A1412	Scope Approval Smelter Dam Removal Package	5	5	0%	08-Jun-12	14-Jun-12*
A1400	Kickoff Meeting	1	1	0%	13-Jul-12	16-Jul-12
A1410	LOSA ET Cover Scope Preparation (SOW 7)	15	15	0%	16-Jul-12	06-Aug-12
A1411	Scope Approval (SOW 7)	5	5	0%	06-Aug-12	13-Aug-12
2012 IM Work Plan (1)		156	74		15-Feb-12 A	19-Sep-12
A3340	Preparation of Draft IM Work Plan 1 (2012)	33	0	100%	15-Feb-12 A	02-Apr-12 A
A3390	Submit Draft IM Work Plan 1	0	0	100%	30-Mar-12 A	
A3350	EPA Review and Comment Period	45	0	100%	02-Apr-12 A	25-May-12 A
A3360	Prepare Revised Draft IM Work Plan 1	20	0	100%	25-May-12 A	08-Jun-12 A
A3362	EPA Review of Final Draft IM Work Plan 1	12	6	0%	29-May-12 A	15-Jun-12
A3370	Public Comment Period Work Plan 1	30	30	0%	03-Jul-12*	01-Aug-12
A3380	Prepare Final IM Work Plan 1	35	35	0%	02-Aug-12	19-Sep-12
A3450	Final Work Plan 1 Complete	0	0	0%		19-Sep-12
2013 IM Work Plan (2)		193	193		08-Jun-12	05-Mar-13
A5340	Preparation of Draft IM Work Plan 2 (2013)	60	60	0%	08-Jun-12	30-Aug-12*
A5390	Submit Draft IM Work Plan 2	0	0	0%		30-Aug-12*
A5350	EPA Review and Comment Period	45	45	0%	31-Aug-12	01-Nov-12
A5360	Prepare Final Draft IM Work Plan 2	23	23	0%	02-Nov-12	04-Dec-12
A5470	EPA Approval Final Draft IM Work Plan 2	12	12	0%	05-Dec-12	20-Dec-12
A5370	Public Comment Period Work Plan 2	30	30	0%	21-Dec-12	19-Jan-13
A5380	Prepare Final IM Work Plan 2	32	32	0%	21-Jan-13	05-Mar-13
A5450	Final Work Plan 2 Complete	0	0	0%		05-Mar-13
IM Construction Contracts		974	882		01-Feb-12 A	26-Oct-15
A3460	Completion of Contracts 1-7	1	1	0%	26-Oct-15	26-Oct-15
Surface Water Rights Points of Diversion Relocation		100	100		01-Feb-12 A	25-Oct-12
A3300	Complete Surface Water POD Relocation (Hydrometrics)	100	100	0%	01-Feb-12 A	25-Oct-12
Contract 1 Bidding and Construction		201	201		28-Nov-12	04-Sep-13
A1570	Approval to Issue Bid	0	0	0%	28-Nov-12	
A1580	Bidding and Award	35	35	0%	28-Nov-12	15-Jan-13
A3480	Winter Work Suspension	75	75	0%	03-Dec-12*	15-Mar-13
A1590	NTP	0	0	0%	16-Jan-13	
A1591	Temporary Bypass Construction (Phase 1)	83	83	0%	18-Mar-13	10-Jul-13
A1592	Divert PPC	5	5	0%	11-Jul-13	17-Jul-13
A1610	UL Diversion Structure and UL Dam Removed	0	0	0%		17-Jul-13
A1600	PPC Temporary Bypass Operating	0	0	0%	18-Jul-13	
A1593	Temporary Bypass Construction (Phase 2)	35	35	0%	18-Jul-13	04-Sep-13



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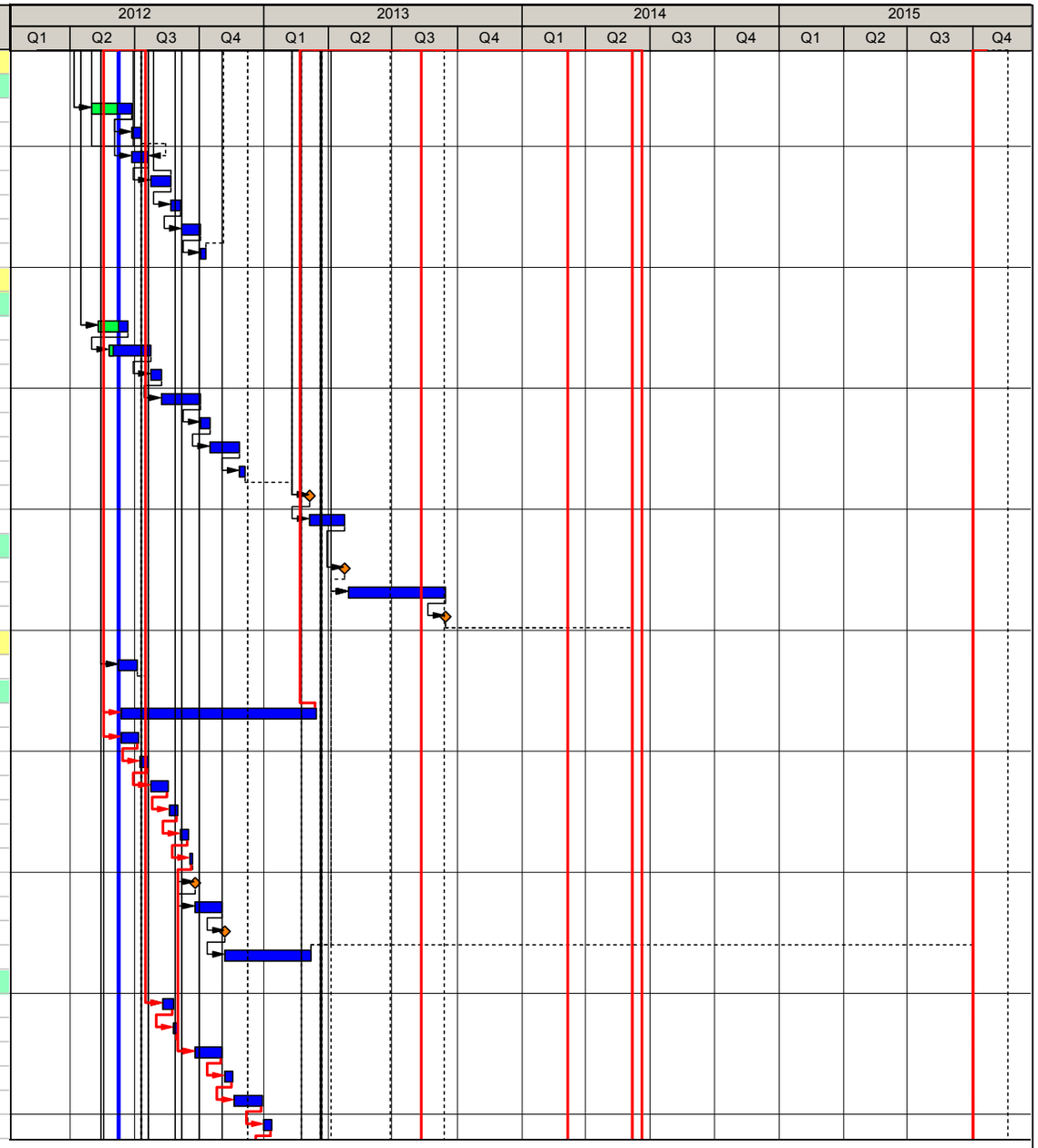
Activity ID	Activity Name	Original Duration	Remaining Duration	Physical % Complete	Start	Finish
Contract 1 - PPC Temporary Bypass		117	88		30-Apr-12 A	09-Oct-12
PPC Temporary Bypass Construction		117	88		30-Apr-12 A	09-Oct-12
P1430	PPC Bypass Concept Design 30%	35	13	50%	30-Apr-12 A	26-Jun-12
P1440	PPC Bypass Beneficiary Review 30%	10	10	0%	27-Jun-12	10-Jul-12
P1450	PPC Bypass Detail Design 60%	20	18	0%	27-Jun-12	20-Jul-12
P1460	PPC Bypass Detail Design 90%	22	22	0%	23-Jul-12	21-Aug-12
P1470	PPC Bypass Beneficiary Review 90%	10	10	0%	22-Aug-12	04-Sep-12
P1560	Contract Documents Prep PPC Bypass	20	20	0%	05-Sep-12	02-Oct-12
P1490	PPC Bypass Beneficiay Reveiw CDs	5	5	0%	03-Oct-12	09-Oct-12
Contract 2 - Onsite CAMU		337	331		10-May-12 A	13-Sep-13
TP/APSD/LL CAMU (Accept Waste in 2013)		234	228		10-May-12 A	23-Apr-13
A1630	Onsite CAMU Siting Analysis	30	10	66%	10-May-12 A	21-Jun-12
A1640	Onsite CAMU Concept Design 30%	25	23	5%	25-May-12 A	24-Jul-12
A1650	Onsite CAMU Beneficiary Review 30%	10	10	0%	24-Jul-12	07-Aug-12
A1660	Onsite CAMU Detail Design 90%	40	40	0%	07-Aug-12	02-Oct-12
A1665	Onsite CAMU Beneficiary Review 90%	10	10	0%	02-Oct-12	16-Oct-12
A1670	Prepare Contract Documents Onsite CAMU	30	30	0%	16-Oct-12	27-Nov-12
A1675	Onsite CAMU Beneficiary Review CDs	5	5	0%	27-Nov-12	04-Dec-12
A1690	Approval to Issue Bid Documents Onsite CAMU	0	0	0%	06-Mar-13	
A1700	Bidding and Award	35	35	0%	06-Mar-13*	23-Apr-13
NTP/Construction		103	103		24-Apr-13	13-Sep-13
A1710	NTP	0	0	0%	24-Apr-13	
A1720	Construction	100	100	0%	29-Apr-13	13-Sep-13
A1750	CAMU Construction Complete	0	0	0%		13-Sep-13
Contract 3 - Building and Utility Demolition		397	397		08-Jun-12	16-Dec-13
A1760	Building/Utility Demolition Sequencing Plan	20	20	0%	08-Jun-12	05-Jul-12
Phase 1 - Contract 3		200	200		11-Jun-12	15-Mar-13
A1870	Utility Relocations	200	200	0%	11-Jun-12	15-Mar-13
A1810	Demo Phase 1 Concept Design 30%	20	20	0%	11-Jun-12	06-Jul-12
A1820	Demo Phase 1 Beneficiary Review 30%	10	10	0%	09-Jul-12	20-Jul-12
A1830	Demo Phase 1 Detail Design 90%	20	20	0%	23-Jul-12	17-Aug-12
A1840	Demo Phase 1 Beneficiary Review 90%	10	10	0%	20-Aug-12	31-Aug-12
A1970	Contract Documents Prep	10	10	0%	03-Sep-12	14-Sep-12
A1971	Demo Phase 1 Beneficiary Review CDs	5	5	0%	17-Sep-12	21-Sep-12
A1980	Approval to Issue Bid	0	0	0%	24-Sep-12	
A1990	Bidding and Award	30	30	0%	24-Sep-12	02-Nov-12
A2000	NTP	0	0	0%	05-Nov-12	
A2010	Construction	90	90	0%	05-Nov-12	08-Mar-13
Phase 2 - Contract 3		352	352		10-Aug-12	16-Dec-13
A1292	Demo Phase 2 SOW Preparation	10	10	0%	10-Aug-12	24-Aug-12*
A1293	SOW Approval	5	5	0%	24-Aug-12	31-Aug-12
A1815	Demo Phase 2 Concept Design 30%	30	30	0%	24-Sep-12	02-Nov-12
A1825	Demo Phase 2 Beneficiary Review 30%	10	10	0%	05-Nov-12	16-Nov-12
A1835	Demo Phase 2 Detail Design 90%	30	30	0%	19-Nov-12	28-Dec-12
A1845	Demo Phase 2 Beneficiary Review 90%	10	10	0%	31-Dec-12	11-Jan-13



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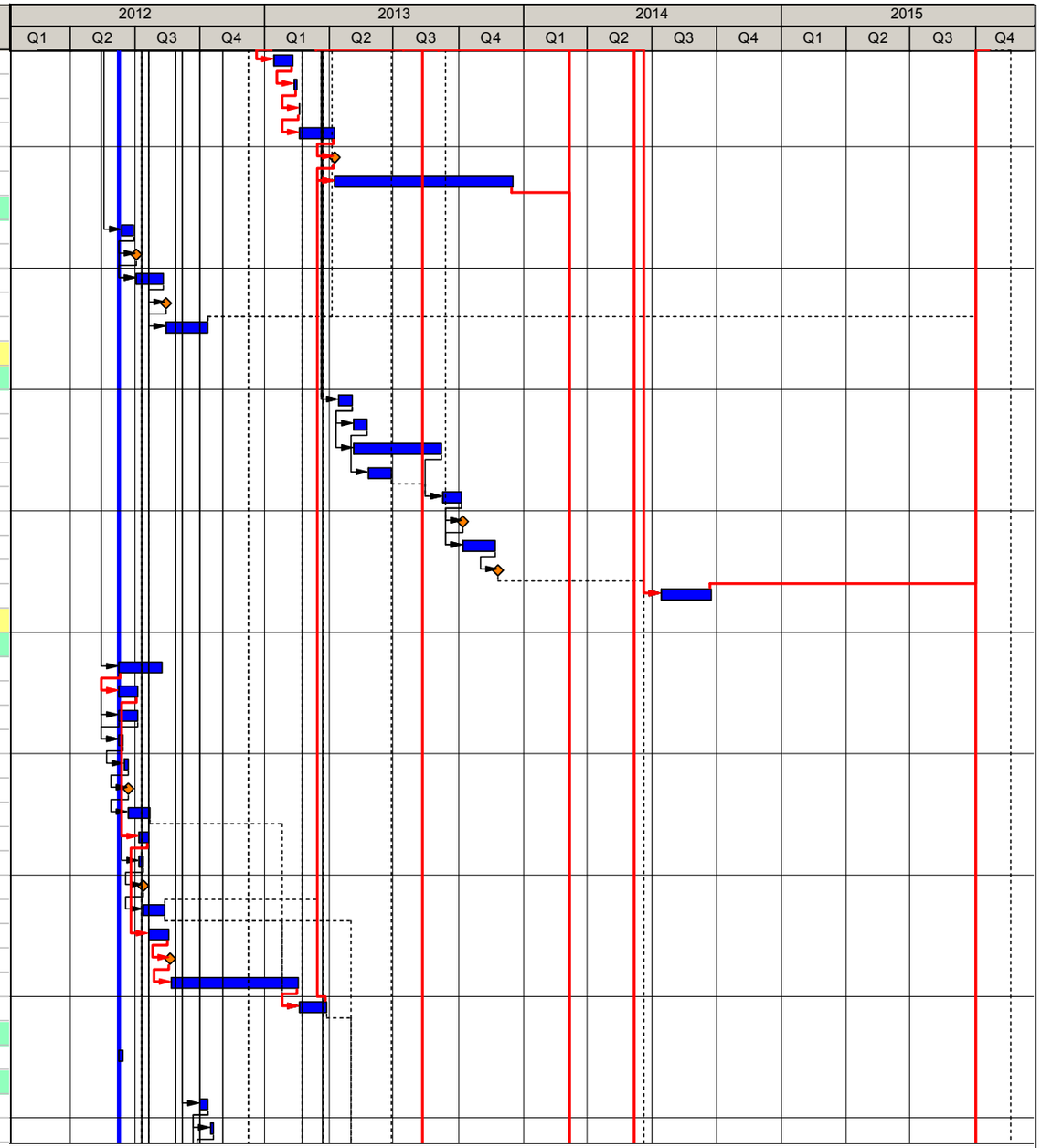
A1920	Demo Phase 2 Contract Documents Prep	20	20	0%	14-Jan-13	08-Feb-13
A1921	Demo Phase 2 Beneficiary Review CDs	5	5	0%	11-Feb-13	15-Feb-13
A1930	Demo Phase 2 Approval to Issue Bid	1	1	0%	18-Feb-13	18-Feb-13
A1940	Demo Phase 2 Bidding and Award	35	35	0%	19-Feb-13	08-Apr-13
A1950	NTP	0	0	0%	09-Apr-13	
A2015	Construction Demo Phase 2	180	180	0%	09-Apr-13*	16-Dec-13
Contract 3 Barnum & Bailey Salvage Contract Bidding and Construc		90	90		11-Jun-12	12-Oct-12
A2100	Contract Documents Prep	15	15	0%	11-Jun-12	29-Jun-12
A2110	Approval to Issue Bid	0	0	0%	02-Jul-12	
A2120	Bidding and Award	30	30	0%	02-Jul-12	10-Aug-12
A2130	NTP	0	0	0%	13-Aug-12	
A2140	Construction	45	45	0%	13-Aug-12	12-Oct-12
Contract 4 - Smelter Dam Demolition		376	376		15-Apr-13	22-Sep-14
Smelter Dam Removal		376	376		15-Apr-13	22-Sep-14
A2200	Concept Design	15	15	0%	15-Apr-13*	03-May-13
A2210	Additional Data Gathering	15	15	0%	06-May-13	24-May-13
A2220	Permitting Coordination	90	90	0%	06-May-13	06-Sep-13
A2230	Detailed Design	25	25	0%	27-May-13	28-Jun-13
A2240	Contract Documents	20	20	0%	09-Sep-13	04-Oct-13
A2250	Approve to Issue Bid	0	0	0%	07-Oct-13	
A2260	Bidding and Award	35	35	0%	07-Oct-13	22-Nov-13
A2270	NTP	0	0	0%	25-Nov-13	
A2280	Construction	50	50	0%	15-Jul-14*	22-Sep-14
Contract 5 - Removal Actions		657	657		08-Jun-12	15-Dec-14
Water Treatment Plant Temporary Discharge Design & Permitting		211	211		08-Jun-12	29-Mar-13
A2600	Plans & Spec Development	44	44	0%	08-Jun-12*	08-Aug-12
A5620	MPDES Discharge Permit Prep	20	20	0%	08-Jun-12	05-Jul-12
A5680	ACE Permit #7 Application Prep	20	20	0%	08-Jun-12	05-Jul-12
A5720	LCCD Permit Prep	5	5	0%	08-Jun-12	14-Jun-12
A5730	LCCD Permit Quality Review and Modifications	5	5	0%	15-Jun-12	21-Jun-12
A5740	LCCD Permit Submittal	0	0	0%	22-Jun-12	
A5750	LCCD Agency Review	30	30	0%	22-Jun-12	21-Jul-12
A5670	MPDES Quality Review and Modifications	10	10	0%	06-Jul-12	19-Jul-12
A5690	ACE Permit #7 Quality Review and Modifications	5	5	0%	06-Jul-12	12-Jul-12
A5700	ACE Permit #7 Submittal	0	0	0%	13-Jul-12	
A5710	ACE Permit #7 Agency Review	30	30	0%	13-Jul-12	11-Aug-12
A5660	MPDES DEQ Permit Completeness Review	30	30	0%	20-Jul-12	18-Aug-12
A5635	MPDES DEQ Permit Submittal	0	0	0%	20-Aug-12	
A5640	MPDES DEQ Official Review	180	180	0%	21-Aug-12	16-Feb-13
A2630	Bid Package Development?	30	30	0%	18-Feb-13	29-Mar-13
Water Treatment Plant Interim Discharge Design & Permitting		5	5		08-Jun-12	14-Jun-12
A5760	New Activity	5	5	0%	08-Jun-12	14-Jun-12
Wilson Ditch Head Gate Decommissioning		30	30		01-Oct-12	09-Nov-12
A2310	Concept Design	10	10	0%	01-Oct-12*	12-Oct-12
A2320	Additional Data Gathering	5	5	0%	15-Oct-12	19-Oct-12



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Milestone

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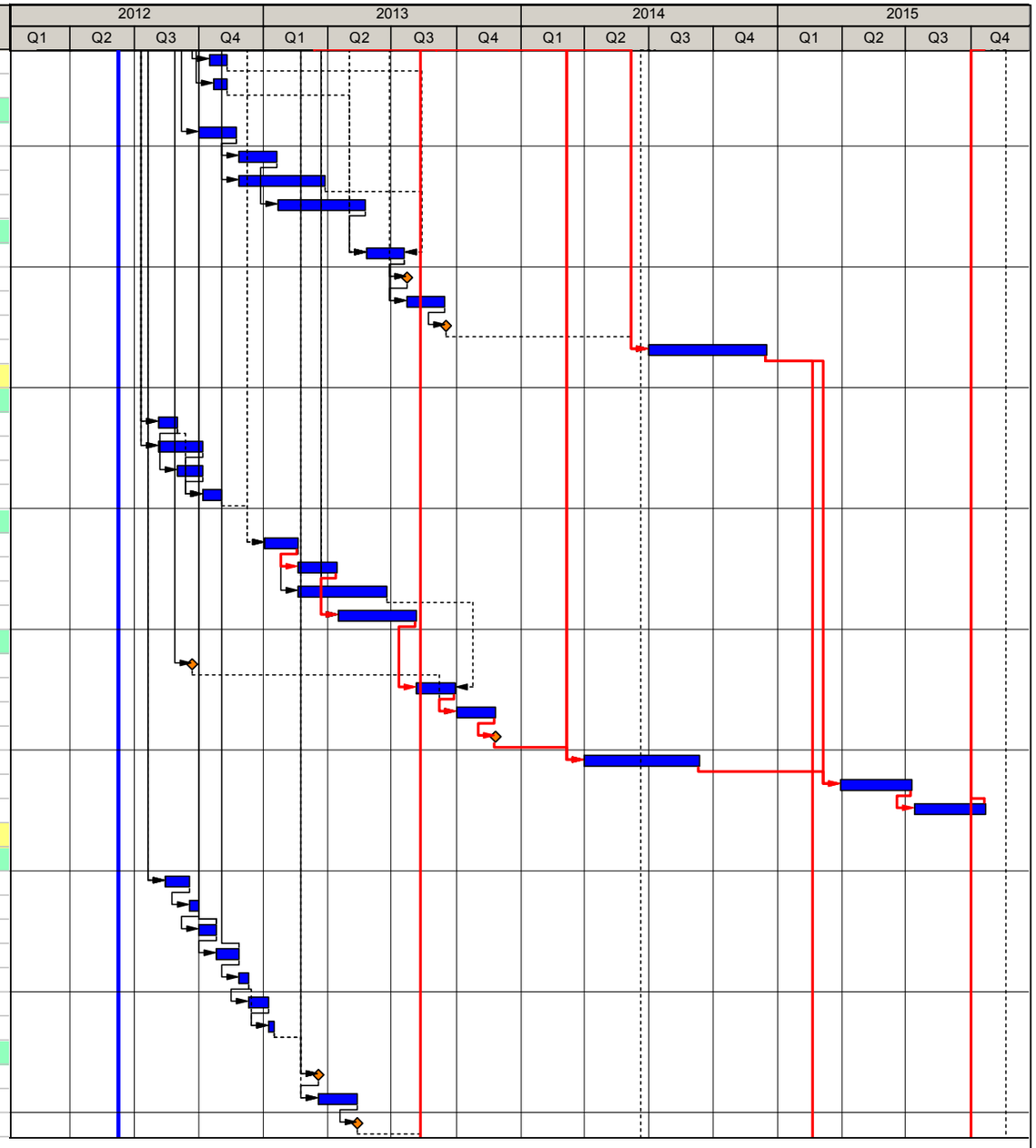
A2330	Permitting Coordination	20	20	0%	15-Oct-12	09-Nov-12
A2340	Detailed Design	15	15	0%	22-Oct-12	09-Nov-12
Tito Park/LL Sediment Removal Actions		170	170		01-Oct-12	24-May-13
A2400	Concept Design	40	40	0%	01-Oct-12*	23-Nov-12
A2410	Additional Data Gathering	40	40	0%	26-Nov-12	18-Jan-13
A2420	Permitting Coordination	90	90	0%	26-Nov-12	29-Mar-13
A2430	Detailed Design	90	90	0%	21-Jan-13	24-May-13
Contract 5 Bidding and Award		406	406		27-May-13	15-Dec-14
A2700	Contract Documents Prep	40	40	0%	27-May-13	19-Jul-13
A2710	Approval to Issue Bid	0	0	0%	22-Jul-13	
A2720	Bidding and Award	40	40	0%	22-Jul-13	13-Sep-13
A2730	NTP	0	0	0%	16-Sep-13	
A2740	Construction Contract 5	120	120	0%	01-Jul-14*	15-Dec-14
Contract 6 - ET Cover		841	841		03-Aug-12	23-Oct-15
Smelter Site ET Cover Approach		65	65		03-Aug-12	02-Nov-12
A2800	Cover Grading and Drainage Evaluation	20	20	0%	03-Aug-12	31-Aug-12
A2810	Cover Effectiveness Modeling	45	45	0%	03-Aug-12	05-Oct-12
A2830	Material Source Evaluation	25	25	0%	31-Aug-12	05-Oct-12
A2820	Cover Selection & Concept Approval	20	20	0%	05-Oct-12	02-Nov-12
ET Cap in Lower Ore Storage Area (LOSA)		155	155		01-Jan-13	05-Aug-13
A2900	Concept Design	35	35	0%	01-Jan-13*	18-Feb-13
A2910	Additional Data Gathering	40	40	0%	19-Feb-13	15-Apr-13
A2920	Permitting Coordination	90	90	0%	19-Feb-13	24-Jun-13
A2930	Detailed Design	80	80	0%	16-Apr-13	05-Aug-13
Contract 6 Bidding and Award		807	807		20-Sep-12	23-Oct-15
A3010	Approval to Issue Bid	0	0	0%	20-Sep-12	
A3000	Contract Documents	40	40	0%	06-Aug-13	30-Sep-13
A3020	Bidding and Award	40	40	0%	01-Oct-13	25-Nov-13
A3030	NTP	0	0	0%	26-Nov-13	
A3040	Construction - ET Cover Phase 1	120	120	0%	31-Mar-14*	12-Sep-14
A3041	Construction - ET Cover Phase 2	75	75	0%	30-Mar-15*	10-Jul-15
A3042	Construction - ET Cover Phase 3	75	75	0%	13-Jul-15	23-Oct-15
Contract 7 - PPC Realignment		790	790		13-Aug-12	21-Aug-15
PPC Realignment		110	110		13-Aug-12	14-Jan-13
A3100	PPC Realignment - Concept Design 30%	25	25	0%	13-Aug-12	17-Sep-12
A5480	PPC Realignment - Beneficiary Review 30%	10	10	0%	17-Sep-12	01-Oct-12
A5490	PPC Realignment - Detail Design 60%	18	18	0%	01-Oct-12	25-Oct-12
A5500	PPC Realignment - Detail Design 90%	22	22	0%	25-Oct-12	26-Nov-12
A5520	PPC Realignmnet - Beneficiary Review 90%	10	10	0%	26-Nov-12	10-Dec-12
A3200	PPC Realignment - Contract Document Prep	20	20	0%	10-Dec-12	07-Jan-13
A5510	PPC Realignment - Beneficiay Reveiw CDs	5	5	0%	07-Jan-13	14-Jan-13
Contract 7 Bidding and Construction		634	634		19-Mar-13	21-Aug-15
A3210	Approval to Issue for Bid	0	0	0%	19-Mar-13	
A3220	Bidding and Award	40	40	0%	19-Mar-13	14-May-13
A3230	NTP	0	0	0%	14-May-13	



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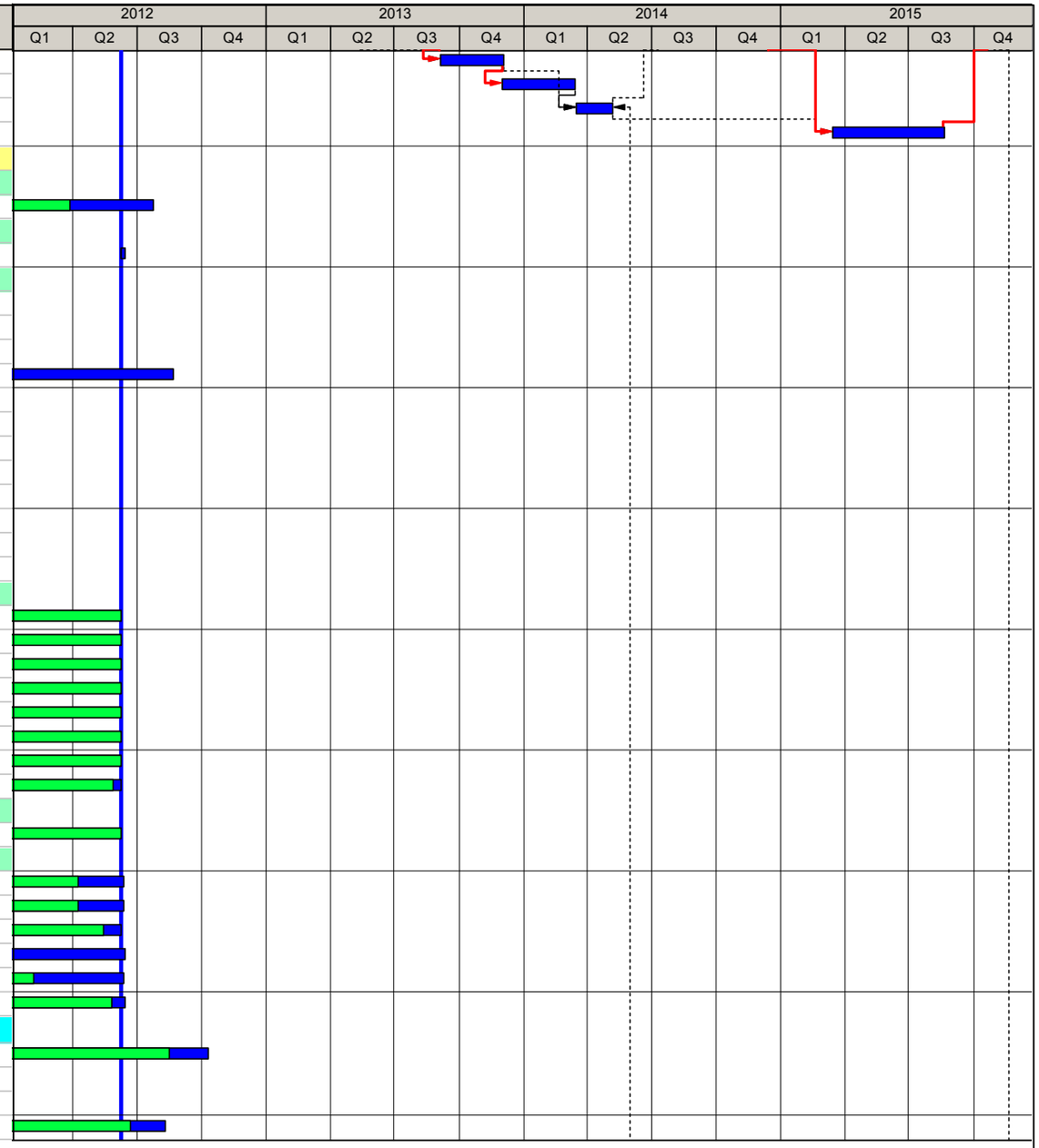
A3240	Construction - North Section (Initial)	63	63	0%	05-Sep-13	02-Dec-13
A3520	Winter Work Suspension	75	75	0%	02-Dec-13*	14-Mar-14
A3530	Construction - North Section (Final)	37	37	0%	17-Mar-14	06-May-14
A3510	Construction - South Section	115	115	0%	16-Mar-15*	21-Aug-15
Natural Resources Studies & Permitting		213	52		23-Aug-11 A	20-Aug-12
Task Management		65	33		30-Nov-11 A	24-Jul-12
EHNR600	Task Management	65	33	50%	30-Nov-11 A	24-Jul-12
Beneficiary Meeting		5	5		08-Jun-12	14-Jun-12
EHNR500	Prepare for Beneficiary Meeting	5	5	0%	08-Jun-12	14-Jun-12
Preliminary Permitting Research		94	52		23-Aug-11 A	20-Aug-12
EHNR100	Prepare Environmental Checklist	50	0	100%	23-Aug-11 A	30-Dec-11 A
EHNR110	Issue Draft Environmental Checklist	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR120	METG/EPA Review	65	0	100%	03-Oct-11 A	08-Dec-11 A
EHNR130	Issue Final Environmental Checklist	65	52	20%	03-Oct-11 A	20-Aug-12
EHNR140	Prepare Preliminary Permitting Matrix	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR150	Issue Draft Permitting Matrix	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR160	METG/EPA Review	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR170	Issue FInal Permitting Matrix	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR180	Conduct Agency Communications	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR190	Identify Permitting Data Gaps	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR195	Prepare Timeline for Filling Data Gaps	65	0	100%	03-Oct-11 A	30-Dec-11 A
EHNR198	Prepare Recommended Tasks and Budgets for Continuing P	22	0	100%	01-Dec-11 A	02-Jan-12 A
Wetland Delineation and Functional Values Assessment		55	0		23-Aug-11 A	08-Jun-12
EHNR200	Prepare Draft Workplan for Conducting Field Work	50	0	0%	23-Aug-11 A	08-Jun-12
EHNR210	METG/EPA Review	5	0	0%	03-Oct-11 A	08-Jun-12
EHNR220	Issue Final Work Plan for Conducting Field Work	5	0	0%	07-Oct-11 A	08-Jun-12
EHNR230	Conduct Wetlands Delineation Field Work	12	0	0%	14-Oct-11 A	08-Jun-12
EHNR240	Conduct Functional Values Assessment Field Work	5	0	0%	14-Oct-11 A	08-Jun-12
EHNR250	Prepare Draft Data Summary Report	5	0	0%	14-Oct-11 A	08-Jun-12
EHNR260	METG/EPA Review	5	0	0%	21-Oct-11 A	08-Jun-12
EHNR270	Issue Final Data Summary Report	5	0	0%	01-Nov-11 A	08-Jun-12
South Plant Hydraulic Controls Concept Plan		50	0		30-Nov-11 A	08-Jun-12
EHIMCMS330	Prepare SPHC Concept Plan	50	0	0%	30-Nov-11 A	08-Jun-12
Stream Habitat and General Geomorphological Assessment		92	5		01-Oct-11 A	14-Jun-12
EHNR410	Issue Work Plan for Conducting Field Work	5	1	75%	01-Oct-11 A	11-Jun-12
EHNR420	Conduct Stream Habitat and Functional Values Assessment	5	1	75%	01-Oct-11 A	11-Jun-12
EHNR430	Prepare Draft Data Summary Report	5	1	90%	01-Oct-11 A	08-Jun-12
EHNR440	METG/EPA Review	5	5	0%	01-Oct-11 A	14-Jun-12
EHNR450	Issue Final Data Summary Report	5	3	50%	01-Oct-11 A	12-Jun-12
EHNR400	Prepare Work Plan for Conducting Field Work	50	5	90%	30-Nov-11 A	14-Jun-12
Project Management and Communications		62	88		06-Apr-11 A	09-Oct-12
EHIMCMS150	Project Management/Communications (CH2MHILL)	62	88	90%	06-Apr-11 A	09-Oct-12
EHIMCMS160	Project Setup	18	0	100%	06-Apr-11 A	22-Apr-11 A
EHIMCMS190	Subcontract Implementation (MMI, Pioneer, Critegen)	25	0	100%	06-Apr-11 A	10-May-11 A
EHIMCMS200	Program Managment Plan	62	45	90%	06-Apr-11 A	09-Aug-12



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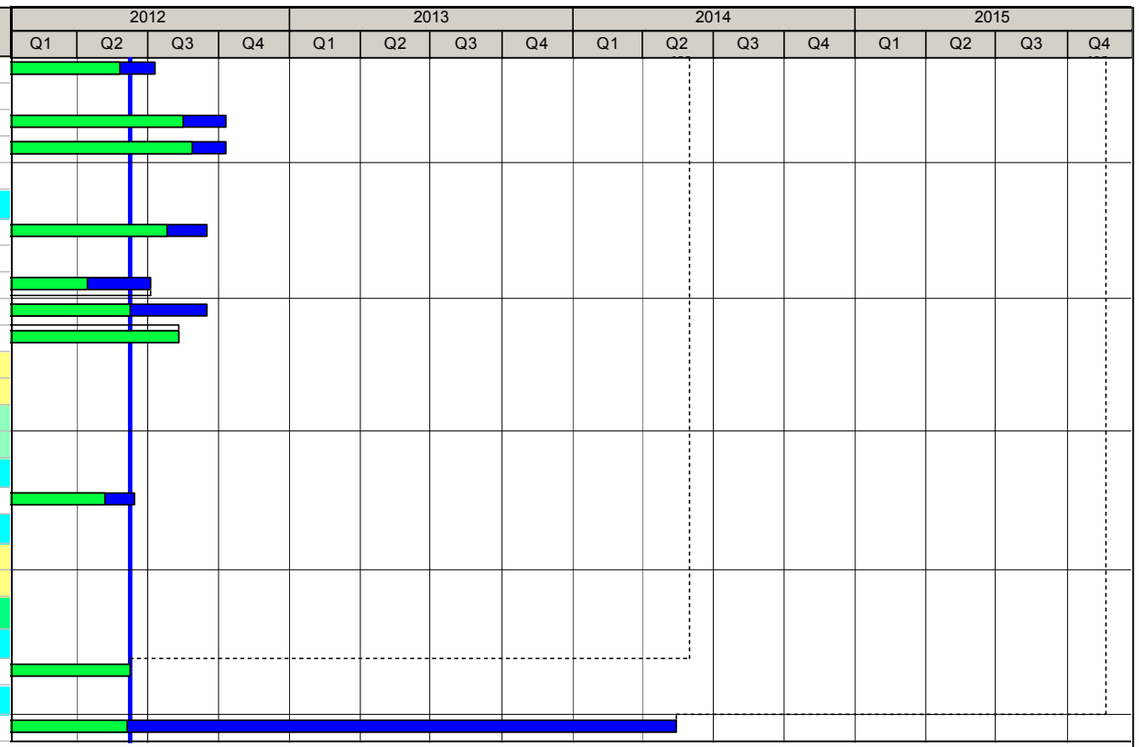
EHIMCMS210	Meetings	62	23	90%	06-Apr-11 A	10-Jul-12
EHIMCMS220	Response Documents/Regulatory review	22	0	100%	06-Apr-11 A	05-May-11 A
EHIMCMS230	Project Administration	62	88	90%	06-Apr-11 A	09-Oct-12
EHIMCMS240	Work Planning	5	88	92%	06-Apr-11 A	09-Oct-12
EHIMCMS180	Develop Preliminary Project Control System	18	0	100%	18-Apr-11 A	29-Apr-11 A
Corrective Measures Study		181	71		05-May-11 A	14-Sep-12
EHCMS100	CMS Work Plan (WP Process)	181	71	90%	05-May-11 A	14-Sep-12
EHCMS105	CMS Kickoff Mtg	1	0	100%	05-May-11 A	05-May-11 A
EHCMS107	Develop RAOs (Remedial Action Objectives)	42	20	80%	16-May-11 A	05-Jul-12
EHCMS109	Prepare Draft CMS WP	90	50	80%	16-May-11 A	14-Sep-12
EHCMS110	Historical Data Review	18	45	100%	27-May-11 A	09-Aug-12
CMS Work Plan (WP Process)(J10)		0	0			
Nature & Extent		0	0			
Soil		0	0			
Groundwater/Surface Water		0	0			
Long-Term Planning		23	5		30-Nov-11 A	14-Jun-12
A1010	Draft 5 Year Plan Schedule	23	5	75%	30-Nov-11 A	14-Jun-12
Nature and Extent		0	0			
Soil		0	0			
Groundwater/Surface Water		0	0			
Financial Affairs		110	504		02-May-11 A	14-May-14
Financial Affairs		5	0		01-Dec-11 A	08-Jun-12
A1020	Business Management	5	0	100%	01-Dec-11 A	08-Jun-12
Project Controls		110	504		02-May-11 A	14-May-14
EHLNN10020	Project Controls	110	504	36%	02-May-11 A	14-May-14



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Appendix A
Status of Upper Lake Drawdown Testing—June 2012

APPENDIX A

Status of Upper Lake Drawdown Testing—June 2012

Upper Lake acts as a source of recharge to the former Smelter site Upper Aquifer or unconfined groundwater system overlying the Tertiary ash/clay layer. Indications that Upper Lake provides recharge to the former Smelter site groundwater system include its location at the extreme southern (upgradient) end of the site, and the elevated lake level resulting from a berm constructed between the lake and Prickly Pear Creek. Although these physical attributes indicate that Upper Lake increases recharge to the site Upper Aquifer (as compared to pre-lake conditions), the magnitude of recharge attributable to Upper Lake has not previously been quantified. In order to address this conceptual site model data gap, METG initiated an Upper Lake drawdown test to document the response of former Smelter site groundwater levels and flow rates to reduced lake levels. The Upper Lake drawdown test was initiated in fall 2011 and continues to date. Following is a brief synopsis of the testing procedures and status. A detailed technical memorandum describing the drawdown test results and interpretation is scheduled for completion in 2012.

Background. Upper Lake lies within the Prickly Pear Creek floodplain with the lake area lying within the zone of recent active channel migration. A number of abandoned creek channels transect the lake (and adjacent marsh) area, with the channels extending northward onto the former Smelter site beneath the surficial fill material. Due to the high permeability alluvial gravels and cobbles, the former channels likely form preferential flow paths for shallow groundwater between the lake/marsh area and the site.

Upper Lake was initially formed by diverting water from Prickly Pear Creek into what was a large marsh complex at that time. The original lake was considerably smaller in size than its current configuration, with the lake area (and elevation) increased through continued placement of fill north of the lake (Tito Park area), and construction of an earthen berm along the lake's east side in the 1980s. These "improvements" were implemented in part to provide a suitable water source for operation of the Acid Plant and other facility processes. Figure 1 shows the current Upper Lake configuration and various features relevant to this discussion.

With enlargement and raising of the lake level during (and prior to) the 1980s, leakage from the lake increased due to the greater hydraulic gradient and wetted surface area around the lake. Regular dredging of the lake bottom (to facilitate pumping) during smelter operations also promoted leakage from the lake and recharge to the former Smelter site groundwater system. Since the 2001 plant shutdown, Upper Lake has partially filled in with fine grained (low permeability) sediments, reducing the rate of leakage as compared to pre-2001 conditions. Thus, the rate of leakage and groundwater recharge from Upper Lake to the site groundwater system has varied over the years due to a number of factors.

Based on the drawdown test results, leakage from the lake (at full pool level) follows three main pathways: (1) eastward through the east berm to Prickly Pear Creek; (2) northward from the east half of Upper Lake through Tito Park towards Lower Lake, and; (3) northwestward from the west half of the lake through the former Upper Ore Storage area and Acid Plant (where some of the most highly contaminated soils occur), and through the west side of the former Smelter site towards Lamping Field (Figure 1).

Upper Lake Drawdown Test Procedures. The Upper Lake drawdown test involved three distinct phases, including passive lake dewatering achieved by shutting off the diversion inflow from Prickly Pear Creek,

lowering Prickly Pear Creek adjacent to the former Smelter site, and pumping from the lake to expedite lake level drawdown. The drawdown test schedule and monitoring program are summarized below.

Upper Lake Drawdown Test Schedule. The Upper Lake Drawdown Test was initiated in fall 2011 with background (pre-drawdown) water level monitoring in October. Following background data collection, the "passive" dewatering phase of the test began on 11/01/11 when the inlet diversion from Prickly Pear Creek to Upper Lake was shut off. Immediately prior to closing the diversion gates, measured inflow to Upper Lake from the creek was 30 cfs, which represents about half of the creek flow above the diversion gate at that time. Following closure of the diversion gates about 20 gpm flow remained in the Upper Lake inlet channel due to minor leakage around the gates. The diversion gates have remained closed with about 20 gpm leakage since 11/01/11 (Table 2-1).

TABLE 2-1
Upper Lake Drawdown Test Schedule

Test Phase/Milestone	Begin	End	Comments
Background Monitoring	10/1/11	10/31/11	
Shut Off Prickly Pear Ck Inflow	11/01/11	Ongoing	Included closing PP Ck diversion to Upper Lake inlet channel
Drawdown Phase Monitoring	11/01/11	Ongoing	Includes weekly water level measurements
Prickly Pear Creek Drawdown	12/21/11	2/24/12	Included opening lower gates on Smelter Dam
Upper Lake Pumping	3/26/12	Ongoing	Includes continuous pumping from west half and periodic pumping from east half of Upper Lake

The second phase of the test included lowering the Prickly Pear Creek stage above the Smelter Dam (Figure 1) to further drain Upper (and Lower) Lake and south plant groundwater levels. The creek level was lowered approximately six feet by incrementally opening the lower gates on the Smelter Dam. The creek lowering phase began on 12/21/11 and ended (by closing the lower gates) on 2/24/12.

The third phase of the drawdown test involved pumping water from Upper Lake to expedite the lake drawdown. After several months of passive dewatering, the rate of lake level decline slowed considerably leading to the need for pumping. Pumping was initiated on March 26, 2012 with the primary pump intake located in the west half of Upper Lake. The primary pump operated continuously from 3/26/12 through 5/18/12 with relatively few interruptions. Due to the greatly reduced stage and depth of Upper Lake, the primary pump has operated on a cyclic schedule since 5/18/12 in response to fluctuating lake levels. A secondary pump set up in the east half of the lake operated periodically (during normal working hours) from 3/26/12 through 4/9/12. Each pump typically discharged between 80 to 120 gpm when operating, with the discharge water piped to an infiltration basin located near Prickly Pear Creek. A total of approximately 5.5 million gallons was pumped from Upper Lake between 3/26/12 and 4/30/12.

Monitoring Program. The drawdown test monitoring program is focused primarily on measurement of water levels throughout and peripheral to the former Smelter site. Water levels are measured continuously at a total of 40 groundwater and surface water sites instrumented with pressure sensitive transducers. The continuous water level data are augmented with weekly manual measurements at an additional 25 sites. The water level data are intended to quantify the groundwater level declines across the former Smelter site, and determine effects of the lake drawdown on hydraulic gradients and groundwater flow rates across the site. Figure 2 shows the current water level monitoring network.

In addition to the water level measurements, flow rates have been monitored on Prickly Pear Creek and a small unnamed tributary to Upper Lake. The creek measurements are intended to document potential

changes in creek flow caused by lake dewatering, while the tributary flows will be used as part of the Upper Lake water balance model. Lastly, Upper Lake water depths were measured and lake bottom elevations recorded on March 5, 2012 with the results shown on Figure 3.

Drawdown Test Results

Groundwater Levels. Figure 4 shows water levels trends in Upper Lake, Lower Lake, and the south side of the former Smelter site area wells through the duration of the Upper Lake drawdown test, with cumulative drawdown from all three phases of the test summarized in Table 2-2. As shown in the figure and table, cumulative drawdown to date is about 4.0 feet in Upper Lake, 2.6 feet in Lower Lake, and 3.0 to 5.0 feet in the south plant area wells. Water levels began declining immediately at all sites after 11/1/11 when the lake inflow was shut off, with most sites continuing to decline through December (Figure 4). Drawdown at all sites increased further with the onset of creek lowering on 12/21/11, with the greatest effect seen at well APSD-8, located between Lower Lake and Prickly Pear Creek (see Figure 2 for well locations). The effect of creek lowering on groundwater levels is also illustrated by the rising water levels throughout the south plant area when the creek level was raised (Figure 4). The effects of lake pumping on groundwater levels is also discernible in Figure 4 with water levels declining at all wells with the onset of pumping, with the exception of well DH-3. DH-3 is completed in tertiary sediments immediately west of Upper Lake and exhibited an increase in water levels from 5/11 to 5/17/12 (far right side of Figure 4 graph). This increase is most likely due to background seasonal water level trends in the tertiary sediment groundwater system and exemplifies the differences in behavior between the tertiary groundwater system and alluvial groundwater system on the former Smelter site.

TABLE 2-2
Water Level Drawdown at Key Locations Throughout Upper Lake Drawdown Test

Site	Passive Dewatering Phase	Creek Lowering Phase	Pumping Phase	Cumulative Drawdown
Upper Lake	1.4	1.5	1.1	4.0
Lower Lake	1.1	1.1	0.4	2.6
DH-20	1.8	0.7	0.5	3.0
APSD-8	0.2	2.3	1.0	3.5
APSD-9	2.7	0.8	1.5	5.0

All measurements in feet.

Figure 5 shows measured water level declines across the former Smelter site from October 31, 2011 (start of the drawdown test) to February 14, 2012 (towards the end of the creek drawdown phase). Water level declines are greatest in the west portion of Tito Park (near the creek), illustrating the significant influence of the creek on south plant groundwater levels. Significant declines (up to three feet) are also seen in the western portion of the former Smelter site, with declines in this area due primarily to lake dewatering and associated decrease in recharge to the Acid Plant area. Water level declines are notably less in the east portion of the plant, with declines of less than a foot beneath the slag pile. The limited water level response in the east plant area indicates limited interaction between groundwater from the south plant area (Upper Lake/Lower Lake/Tito Park), and the slag pile area.

It should be noted that the water level declines shown in Figure 5 were recorded near the end of the creek lowering phase of the test and do not include declines realized through the subsequent pumping phase of the test. Also, because the creek lowering phase ended on 2/24/12, the effects of combined Upper Lake and Prickly Pear Creek lowering are not reflected in the water level measurements recorded to date. If the creek level had remained lowered, total groundwater level declines would currently be

greater than currently realized. More detailed analyses of the combined effects of lake and creek lowering, as would occur under the South Plant Hydraulic Control project, will be included in the Upper Lake drawdown test technical memorandum.

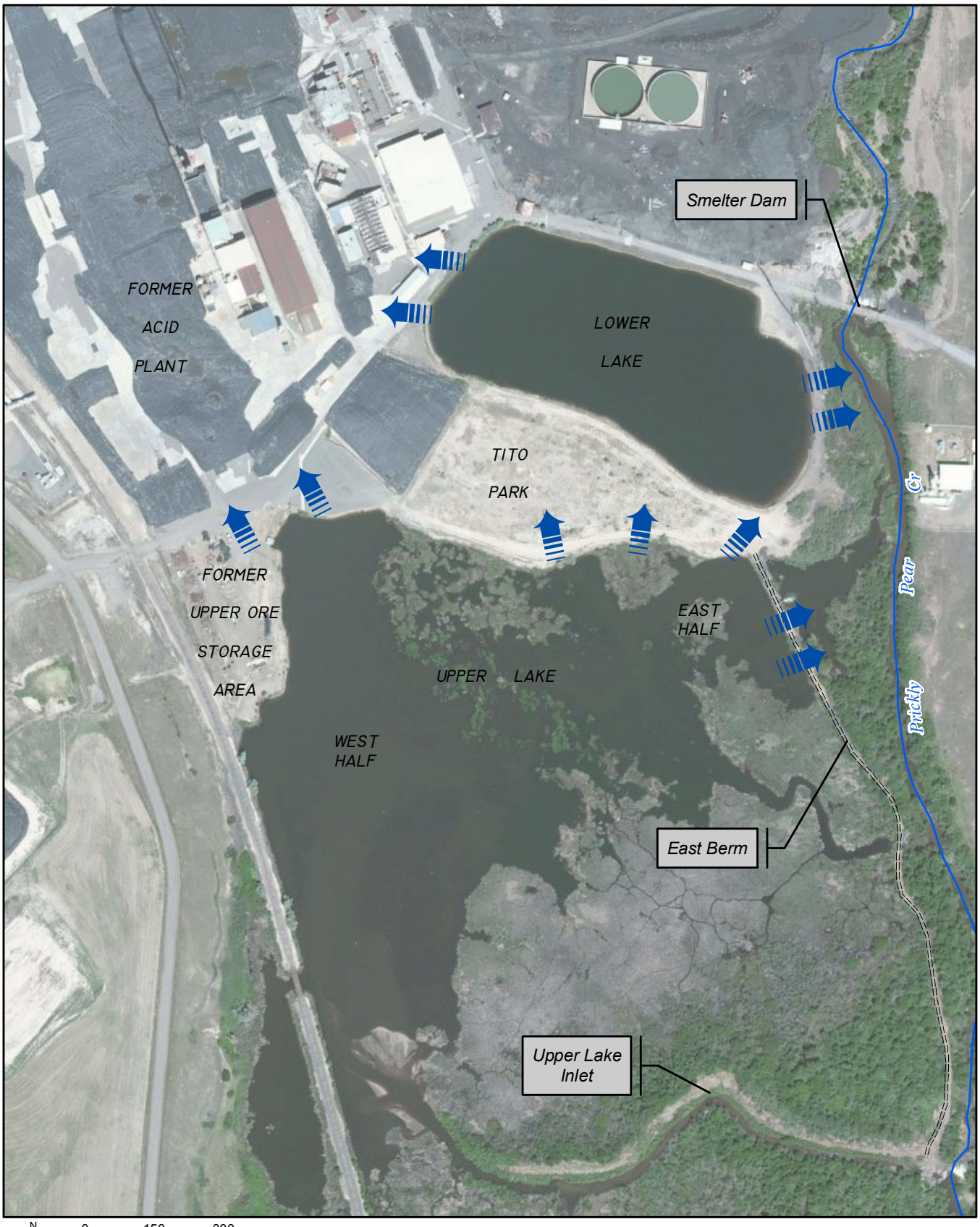
Estimated Upper Lake Leakage Rates. Based on the preliminary drawdown test results, Upper Lake leakage rates have been estimated for both the full and dewatered lake condition. At full pool elevation (about 3920 foot amsl), leakage from Upper Lake is estimated to be approximately 200 to 250 gpm. At a lake level of 3918 feet, corresponding to the lake level at the beginning of the creek lowering phase, the leakage rate is estimated to be about 100 to 150 gpm. These values represent leakage under current "silted-in" lake bottom condition, with leakage rates during smelter operations (when Upper Lake was routinely dredged) most likely higher. The estimated leakage rates include leakage from all three leakage areas shown in Figure 1 (through east berm, Tito Park and Acid Plant). The proportion of leakage through each area will be evaluated further in the tech memo.

Summary of Results to Date. The Upper Lake drawdown test results show groundwater level declines on the order of 3 to 5 feet in the south plant area, with water levels continuing to decline. The magnitude of decline will undoubtedly be greater with continued dewatering of Upper and Lower Lake and lowering of Prickly Pear Creek on a permanent basis, as proposed for the SPHC project. Although detailed evaluations have yet to be completed, groundwater levels in the Acid Plant and Upper Ore Storage areas are expected to decline by five feet or more, which would lower groundwater levels below the most highly contaminated soils. The decreased interaction between the former Smelter site groundwater and contaminated soils, coupled with the anticipated reductions in hydraulic gradients and groundwater flow rates through the site, should result in reduce contaminant leaching to groundwater and reduced groundwater contaminant loads, in pounds per day, emanating from the site.

Besides the creek lowering and elimination of Upper Lake, another key component of the SPHC project is construction of a low permeability "cutoff" wall around the northwest portion of Upper Lake. Figure 6 shows a schematic cross section of hydrologic conditions in the vicinity of Upper Lake. As shown in the figure, Upper Lake is underlain by 10 feet or more of saturated alluvial gravels, with the gravels at least partially isolated from the lake water by the low permeability lakebed sediments. Groundwater within the underlying gravels represents alluvial groundwater originating from the south and flowing northward through the former Smelter site. Construction of a competent cutoff wall, possibly keyed into the underlying tertiary ash/clay layer (Figure 6), may be necessary to effectively reduce groundwater flow into the former Smelter site from the south.

Based on the preliminary Upper Lake drawdown test results, water level reductions will be greatest through the west and central sections of the former Smelter site where subsurface soil is highly contaminated. This reduction will reduce groundwater contact with contaminated soil and reduce the groundwater flux through these areas, thus reducing constituent leaching to the aquifer. These results suggest that, although elimination of groundwater recharge from Upper Lake will not in itself mitigate all groundwater contaminant issues at the site, elimination of this recharge source, in conjunction with lowering and relocating PPC, will be an important component of the overall site groundwater mitigation plan.

Figures



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0 150 300

Scale in Feet

Hydrometrics, Inc.
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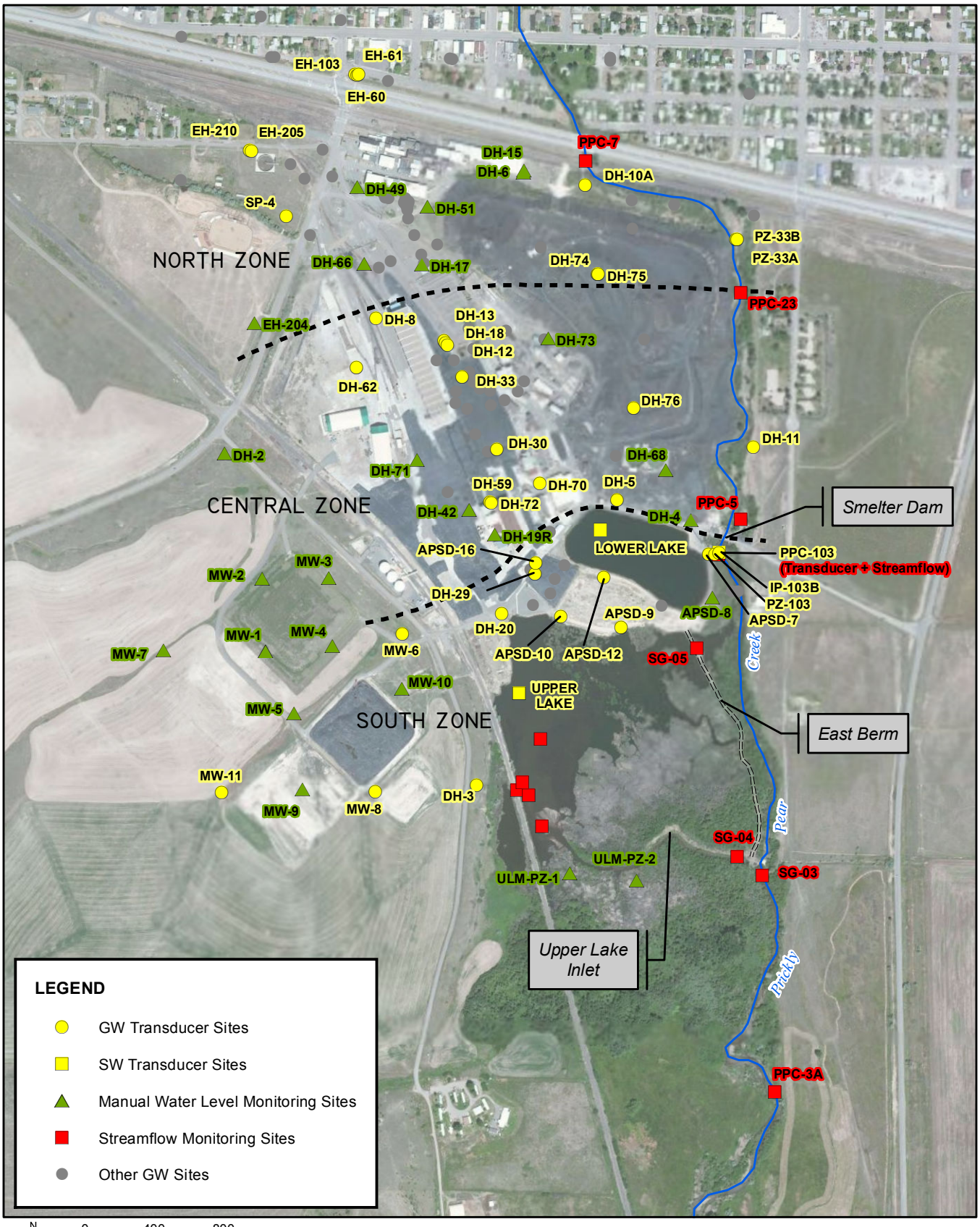
PRIMARY UPPER (AND LOWER) LAKE LEAKAGE PATHWAYS AT MAXIMUM LAKE LEVELS EAST HELENA FACILITY

FIGURE

1



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Consulting Scientists and Engineers

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PRIMARY FEATURES AND WATER LEVEL MONITORING SITES FOR UPPER LAKE DRAWDOWN TEST EAST HELENA FACILITY

FIGURE

2

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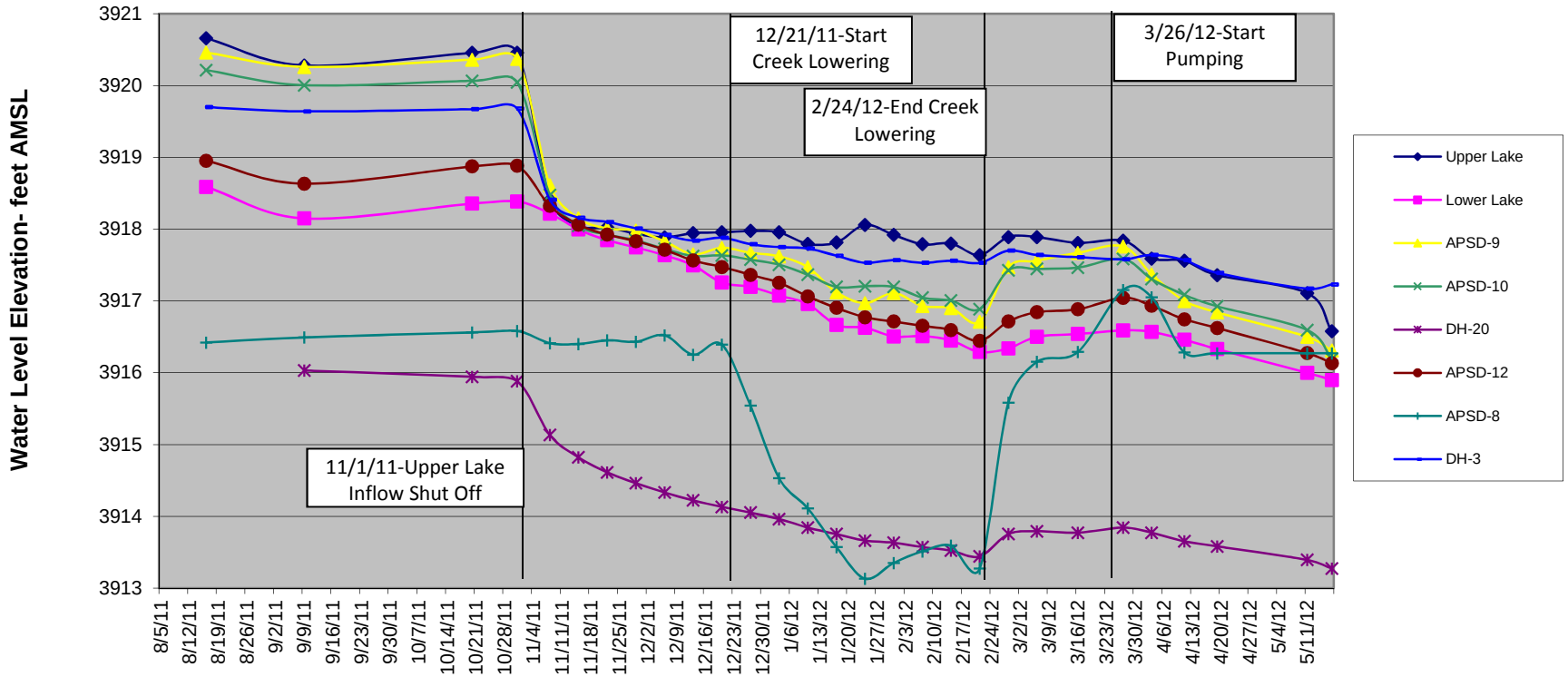
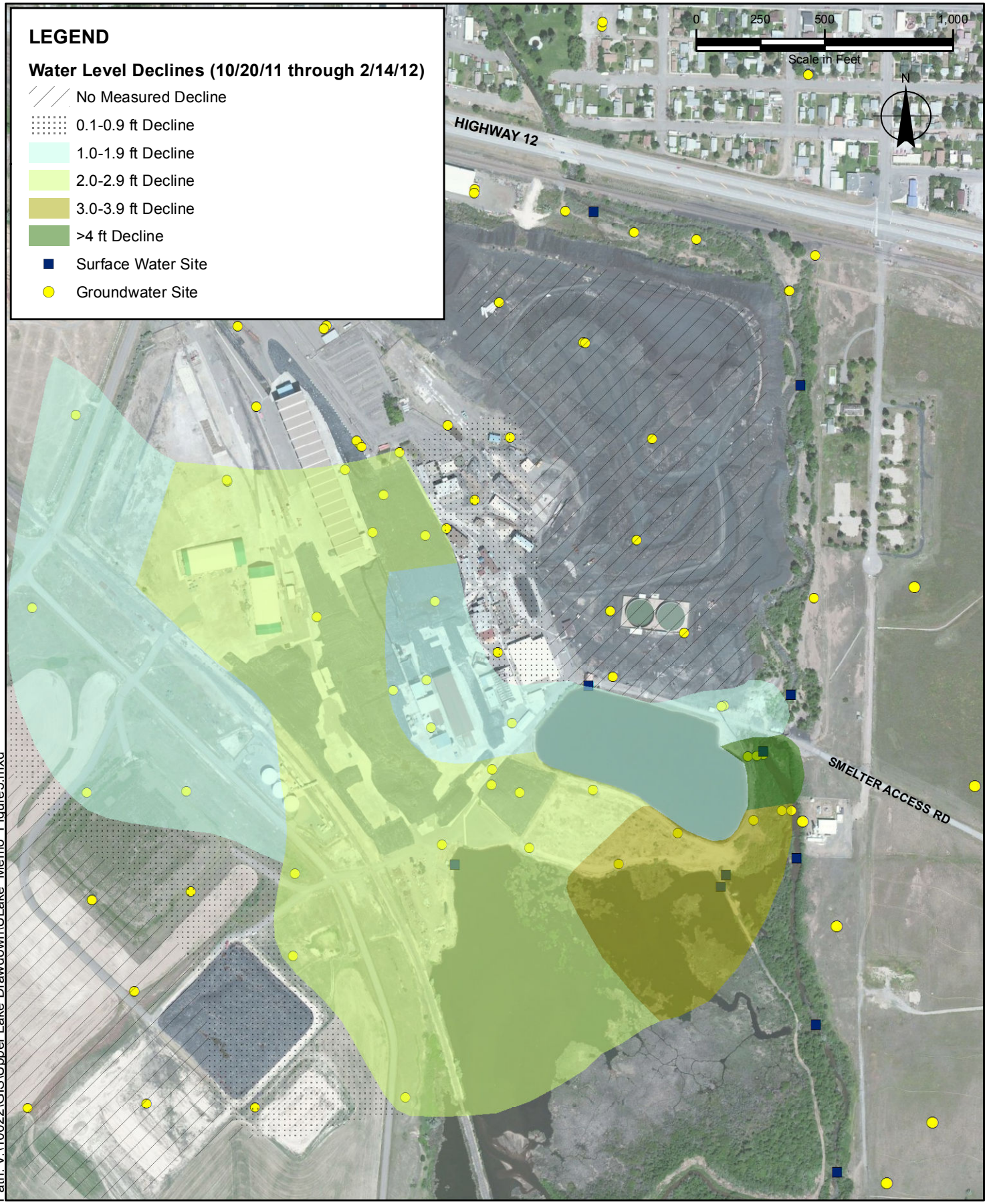
UPPER LAKE DEPTH MEASUREMENTS
MARCH 5, 2012

FIGURE

3

Figure 4. South Plant Area Water Level Response to Upper Lake Dewatering





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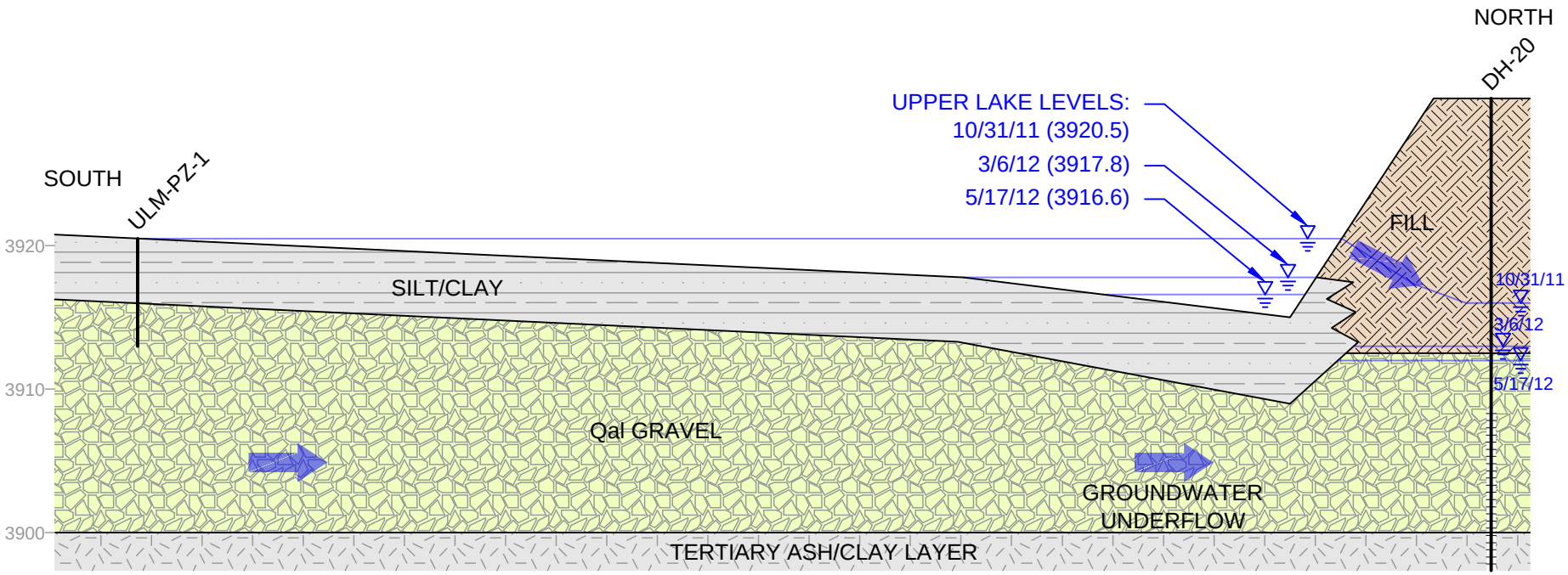
WATER LEVEL DECLINES
UPPER LAKE DRAWDOWN TEST
EAST HELENA FACILITY

FIGURE

5



LEGEND

- FILL
- SILT/CLAY
- GRAVEL/COBBLE
- ASH/CLAY

GROUNDWATER FLOW DIRECTION

SCHEMATIC CROSS SECTION THROUGH UPPER LAKE - WEST HALF

FIGURE **6**

Appendix B
Reference Tables for Section 3

TABLE 3-5
Soil Concentrations By Depth—2009 Post-Demolition Sampling

Depth Interval (ft bgs)	SCM1	SCM2	SCM3	SCM4	SCM5	SCM6	SCM7	OUB 1	OUB2	ABF1	ABF2	APS-1	OSBRR-1
Arsenic Soil Concentrations by Sample Location (mg/kg)													
0 to 4 inches	9	1,290	514	3,090	216	629	1,230	424	1,080	332	388	1,080	2,270
4 to 12 inches	8	684	23	19	31	173	58	589	726	10	18	50	2,070
1 to 2 feet	7	833	36	12	36	49	49	917	858	8	34	274	2,040
2 to 4 feet	12	20	23	11	21	59	20	705	1,330	8	14	25	166
4 to 6 feet	14	13	47	11	14	30	11	126	305	13	34	19	86
6 to 8 feet	19	299	25	12	19	40	28	181	10	72	13	14	36
8 to 10 feet	25	14	11	21	76	13	53	69	84	65	21	9	45
10 to 12 feet	22	7	10	12	34	20	7	34	8	33	14	11	54
12 to 15 feet	8	7	11	18	9	9	24	289	13	27	140	14	162
12 to 15 feet (SPLP)*	ND	ND	ND	0	ND	ND	ND	0	ND	ND	ND	ND	1
Selenium Soil Concentrations by Sample Location (mg/kg)													
0 to 4 inches	ND	13	ND	25	ND	42	6	ND	51	5	8	11	48
4 to 12 inches	ND	ND	ND	ND	ND	38	ND	ND	ND	ND	ND	ND	48
1 to 2 feet	ND	ND	ND	ND	ND	ND	ND	7	6	ND	ND	ND	23
2 to 4 feet	ND	ND	ND	ND	ND	21	ND	ND	10	ND	ND	ND	ND
4 to 6 feet	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6 to 8 feet	ND	ND	ND	ND	ND	14	ND	ND	ND	ND	ND	ND	ND
8 to 10 feet	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
10 to 12 feet	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12 to 15 feet	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12 to 15 feet (SPLP)*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

1. Arsenic screening levels in mg/kg: residential = 0.39, industrial = 1.6, protection of groundwater = 0.29, background = 16.
2. Selenium screening levels in mg/kg: residential = 390, industrial = 5,100, protection of groundwater = 0.26, background = 0.07.
3. Sample locations are shown on Figure 3-7.

* SPLP units are mg/L.

NA indicates that no sample was analyzed for selenium at that depth.

TABLE 3-6

Soil Concentrations By Depth—2008 Post-Demolition Sampling

Depth Interval (ft bgs)	ACP1	ACP2	BFB1	BFB2	BFB3	BFB4	BFB5	BLF1	BLF2	BLF3	BLF4	BLF5	BLF6	BLF7	MOF1	MOF2	MOF3
Arsenic Soil Concentrations by Sample Location (mg/kg)																	
0 to 4 inches	302	1,000	930	2,890	1,850	1,760	3,520	3,580	1,100	2,400	1,050	797	680	1,720	3,850	4,090	1,500
4 to 12 inches	109	50	15	1,370	23	1,170	462	145	1,500	1,330	125	28	247	1,520	3,230	11,500	7,550
1 to 2 feet	413	27	<5	742	21	3,440	1,220	55	2,200	907	111	17	900	29,400	409	1,110	2,890
2 to 4 feet	52	24	<5	192	13	121	1,030	56	757	901	33	25	389	1,600	84	1,100	74
4 to 6 feet	71	31	8	252	22	135	50	62	1,020	217	NA	14	646	1,720	120	15	17
6 to 8 feet	33	39	14	128	12	225	65	82	2,250	NA	NA	546	NA	887	51	33	33
8 to 10 feet	32	30	38	87	72	17	29	25	740	NA	NA	69	NA	1,220	113	13	25
10 to 12 feet	27	22	15	135	19	17	24	23	1,420	NA	NA	NA	NA	652	56	42	63
12 to 15 feet	21	31	26	130	7	8	39	19	649	NA	NA	NA	NA	186	37	126	7
12 to 15 feet (SPLP)*	<0.1	<0.1	<0.1	0.5	<0.1	<0.1	<0.1	<0.1	5.5	0.4**	0.2**	0.2**	2.3**	1.8	<0.1	<0.1	<0.1
Selenium Soil Concentrations by Sample Location (mg/kg)																	
0 to 4 inches	13	12	<5	7	12	164	30	80	7	11	<5	<5	9	28	229	374	93
4 to 12 inches	35	34	42	41	44	106	49	59	24	30	9	19	29	35	251	1,310	312
1 to 2 feet	42	31	20	33	46	123	40	26	28	17	<5	8	20	133	57	83	130
2 to 4 feet	31	28	16	27	49	43	50	21	15	30	<5	6	17	50	41	77	25
4 to 6 feet	31	48	12	27	22	36	33	27	21	7	NA	13	<5	39	31	13	27
6 to 8 feet	18	29	27	25	22	73	41	28	35	NA	NA	14	NA	35	21	38	8
8 to 10 feet	19	27	18	23	31	35	32	22	24	NA	NA	<5	NA	57	28	34	6
10 to 12 feet	30	30	20	22	20	33	12	15	30	NA	NA	NA	NA	28	22	23	16
12 to 15 feet	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA	<5	<5	<5	<5
12 to 15 feet (SPLP)*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1**	<0.1**	<0.1**	<0.1**	<0.1	<0.1	<0.1	<0.1

Notes:

1. Arsenic screening levels in mg/kg: residential = 0.39, industrial = 1.6, protection of groundwater = 0.29, background = 16.
2. Selenium screening levels in mg/kg: residential = 390, industrial = 5,100, protection of groundwater = 0.26, background = 0.07.
3. Sample locations are shown on Figure 3-7.

* SPLP units are mg/L.

** SPLP sample not taken at 12- to 15-foot interval. The actual depth is last depth of last soil sample.

NA indicates that no sample was analyzed for selenium at that depth

TABLE 3-7

Arsenic Soil Concentrations By Depth—Former Smelter Operations Area

Arsenic Soil Concentrations by Sample Location (mg/kg)																					
Depth (bgs)	**LOS-SS01**	**LOS-SS02**	**LOS-SS05**	**LOS-SS06**	**LOS-SS07**	**LOS-SS10**	**LOS-SS11**	**LOS-SS12**	**LOS-SS13**	**LOS-SS14**	**LOS-SS15**	**LOS-SS3**	**UOP-SS03**	**UOP-SS05**	**UOP-SS06**	**UOP-SS07**	**UOP-SS08**	**UPS-SS08**	**UPS-SS10**	**RC-SS04**	**RC-SS06**	**RC-SS09A**
0 to 4 inches	77	79	NA	92	3,192	396	2,310	1,476	59	1,007	730	261	324	91	25	19	60	203	483	6,171	3,522	4,148
4 to 12 inches	148	77	1,195	541	311	795	2,827	1,515	88	1,353	NA	NA	232	29	46	18	74	83	92	4,732	4,370	5,370
12 to 24 inches	160	142	916	1,778	422	508	922	573	24	1,100	25	27	291	12	33	18	115	80	11	200	6,436	27
24 to 48 inches	137	42	784	2,820	183	421	202	705	15	210	NA	NA	23	12	< 10	22	22	48	11	180	2,935	390
48 to 72 inches	NA	NA	NA	NA	NA	431	NA	NA	NA	NA	18	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Depth (bgs)	**RC-SS09B**	**RC-SS09C**	**RC-SS09D**	**RC-SS10**	**RC-SS3-1**	**RC-SS08**	**RC-SS1**	**RC-SS2A**	**RC-SS2B**	**RC-SS2C**	**RC-SS2D**	**RC-SS1**	**RC-SS13**	**RC-SS26**	**RC-SS27**	**RC-SS28**	**RC-SS29**	**LOS-SS8**	**LOS-SS9**	**RC-SS25**	**RC-SS5**	**RC-SS7**	**UPS-SS11**
0 to 4 inches	3,735	710	3,209	2,726	736	4,984	727	1,119	1,428	1,159	322	1,153	5,259	1,602	4,107	3,712	3,226	56	869	161	6,150	5,100	313
4 to 12 inches	2,467	4,679	2,888	2,861	274	3,065	494	1169	942	2,027	661	122	1,063	417	5,648	1,313	2,150	NA	NA	NA	NA	NA	259
12 to 24 inches	539	859	419	199	193	940	411	412	749	436	1,325	122	985	120	1,641	362	1,469	70	61	13	1,170	685	284
24 to 48 inches	38	506	756	113	45	1,687	354	526	59	417	540	118	57	33	2,114	474	450	NA	NA	NA	NA	NA	NA
48 to 72 inches	NA	NA	744	NA	NA	311	352	NA	NA	NA	NA	14	78	20	451	589	1,072	13	23	18	160	588	NA
6 to 8 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,980	127	NA	NA	NA	NA	NA	NA	NA

Depth (bgs)	**UOP-SS2**	**UOP-SS4**	**UOP-SS9**	**UPS-SS9**	**RFI2SB-8**	**RFI2SB-9**	**RFI2SB-10**	**RFI2SB-16**	**RFI2SB-17**	**RFI2SB-20**	**RFI2SB-21**	**RFI2SB-5**	**RFI2SB-6**	**RFI2SB-4**	**RFI2SB-7**	**RFI2SB-12**	**RFI2SB-13**	**RFI2SB-14**	**RFI2SB-15**	**UPS-SS14**	**RC-SS20**	**RC-SS24**	**UPS-SS12**
0 to 4 inches	829	63.2	78	182	557	1,170	109	174	8.3	110	21.6	1,520	354	1,460	2,070	3,700	11	724	3,550	5,955	3,225	666	1,020
4 to 12 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,148	2,217	48	1,600
12 to 24 inches	526	50	90	215	1,530	1,240	25.1	36.3	214	30.9	15.2	874	430	939	1,110	36.9	149	227	556	NA	1,399	222	NA
24 to 48 inches	NA	NA	NA	NA	7	8.9	16.5	20.4	76	36.5	23.8	561	1,460	1,420	29.4	21.2	38	467	725	NA	1,089	206	NA
48 to 72 inches	43	23	16	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36	NA
6 to 8 feet	NA	NA	NA	NA	6	12	10	8	15	56	9	278	161	640	12	12	7	310	708	NA	NA	NA	NA
8 to 10 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10 to 12 feet	NA	NA	NA	NA	21	6	8	20	7	13	29	174	171	394	13	10	5	289	607	NA	NA	NA	NA
12 to 15 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15 to 17 feet	NA	NA	NA	NA	9	11	9	10	10	17	17	487	34	105	910	41	18	84	583	NA	NA	NA	NA
20 to 22 feet	NA	NA	NA	NA	12	9	16	10	13	19	9	11	12	15	175	11	54	70	43	NA	NA	NA	NA
25 to 27 feet	NA	NA	NA	NA	118	7	8	184	34	114	9	<5	<5	25	120	28	33	45	11	NA	NA	NA	NA
30 to 32 feet	NA	NA	NA	NA	52	6	<5	154	168	432	275	NA	NA	8	123	40	13	22	5	NA	NA	NA	NA
35 to 37 feet	NA	NA	NA	NA	54	9		122	261	152	64	NA	NA	NA	NA	67	12	6	8	NA	NA	NA	NA
40 to 42 feet	NA	NA	NA	NA	124	NA	NA	403	25	405	271	NA	NA	NA	NA	7	7	11	10	NA	NA	NA	NA
45 to 47 feet	NA	NA	NA	NA	23	NA	NA	4.9	4.9	5	157	NA	NA	NA	NA	6	6	<5	6	NA	NA	NA	NA
50 to 52 feet	NA	NA	NA	NA	NA	NA	NA	NA	4.9	NA	77	NA	NA	NA	NA	<5	<5	NA	<5	NA	NA	NA	NA
55 to 57 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA	NA	NA	<5	9	NA	14	NA	NA	NA	NA
60 to 62 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	55	NA	NA	NA	NA
62.5 to 64.5 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA	NA	NA

Notes:

1. Arsenic screening levels in mg/kg: residential = 0.39, industrial = 1.6, protection of groundwater = 0.29, background = 16.

2. Selenium screening levels in mg/kg: residential = 390, industrial = 5,100, protection of groundwater = 0.26, background = 0.07.

3. Sample locations are shown on Figure 3-7.

NA indicates that no sample was analyzed for selenium at that depth.

TABLE 3-8

Selenium Soil Concentrations By Depth - Former Smelter Operations Area

Selenium Soil Concentrations by Sample Location (mg/kg)																						
Depth (bgs)	**LOS-SS01**	**LOS-SS02**	**LOS-SS05**	**LOS-SS06**	**LOS-SS07**	**LOS-SS10**	**LOS-SS11**	**LOS-SS12**	**LOS-SS13**	**LOS-SS14**	**LOS-SS15**	**LOS-SS3**	**UOP-SS03**	**UOP-SS05**	**UOP-SS06**	**UOP-SS07**	**UOP-SS08**	**UPS-SS08**	**UPS-SS10**	**RC-SS04**	**RC-SS06**	**RC-SS09A**
0 to 4 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.1	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 to 12 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12 to 24 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
24 to 48 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
48 to 72 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Depth (bgs)	**RC-SS09B**	**RC-SS09C**	**RC-SS09D**	**RC-SS10**	**RC-SS3-1**	**RC-SS08**	**RC-SS1**	**RC-SS2A**	**RC-SS2B**	**RC-SS2C**	**RC-SS2D**	**RC-SS1**	**RC-SS13**	**RC-SS26**	**RC-SS27**	**RC-SS28**	**RC-SS29**	**LOS-SS8**	**LOS-SS9**	**RC-SS25**	**RC-SS5**	**RC-SS7**	**UPS-SS11**
0 to 4 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2	12	2.1	569	754	4.9
4 to 12 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.8
12 to 24 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.1	1.6	0.5	75	98	2.3
24 to 48 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
48 to 72 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	1	0.5	13	96	NA

Depth (bgs)	**UOP-SS2**	**UOP-SS4**	**UOP-SS9**	**UPS-SS9**	**RFI2SB-8**	**RFI2SB-9**	**RFI2SB-10**	**RFI2SB-16**	**RFI2SB-17**	**RFI2SB-20**	**RFI2SB-21**	**RFI2SB-5**	**RFI2SB-6**	**RFI2SB-4**	**RFI2SB-7**	**RFI2SB-12**	**RFI2SB-13**	**RFI2SB-14**	**RFI2SB-15**	**UPS-SS14**	**RC-SS20**	**RC-SS24**	**UPS-SS12**
0 to 4 inches	27	0.9	1.6	6.4	4.9	151	3.3	0.9	0.49	2.3	4.9	<20	7.1	4.2	64	27.1	<0.5	17.2	662	NA	NA	NA	20
4 to 12 inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	27
12 to 24 inches	7	0.5	1.2	3.4	48	281	1.2	0.49	1.9	0.9	4.9	2.2	6.6	0.9	6.6	0.7	2.8	1	74	NA	NA	NA	NA
24- to 8 inches	NA	NA	NA	0.6	<5	0.8	1.1	0.59	0.59	1.1	<5	1.5	106	<5	1.5	<0.5	<0.5	1.9	11	NA	NA	NA	NA
48 to 72 inches	1	0.5	0.5	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6 to 8 feet	NA	NA	NA	NA	<5	<5	<5	<5	<5	7	<5	<5	<5	<5	15	<5	<5	<5	<5	NA	NA	NA	NA
8 to 10 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10 to 12 feet	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA
12 to 15 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15 to 17 feet	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA
20 to 22 feet	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA
25 to 27 feet	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA
30 to 32 feet	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	NA	NA	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA
35 to 37 feet	NA	NA	NA	NA	<5	<5	NA	<5	<5	<5	<5	NA	NA	NA	NA	<5	<5	<5	<5	NA	NA	NA	NA
40 to 42 feet	NA	NA	NA	NA	<5	NA	NA	<5	<5	17	<5	NA	NA	NA	NA	<5	<5	<5	<5	NA	NA	NA	NA
45 to 47 feet	NA	NA	NA	NA	<5	NA	NA	<5	<5	<5	<5	NA	NA	NA	NA	<5	<5	<5	<5	NA	NA	NA	NA
50 to 52 feet	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	<5	NA	NA	NA	NA	<5	<5	NA	<5	NA	NA	NA	NA
55 to 57 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	NA	<5	NA	NA	NA	NA
60 to 62 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA	NA	NA
62.5 to 64.5 feet	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA	NA	NA

Notes:

1. Arsenic screening levels in mg/kg: residential = 0.39, industrial = 1.6, protection of groundwater = 0.29, background = 16.
2. Selenium screening levels in mg/kg: residential = 390, industrial = 5,100, protection of groundwater = 0.26, background = 0.07.
3. Sample locations are shown on Figure 3-7.

NA indicates that no sample was analyzed for selenium at that depth.

TABLE 3-9
Soil Concentrations By Depth – East Bank of PPC

	Arsenic Concentration (mg/kg) by Sample Location			Selenium Concentration (mg/kg) by Sample Location		
Depth BGS	**UOP SS17**	**UOP SS20**	**UOP SS21**	**UOP SS17**	**UOP SS20**	**UOP SS21**
0 to 4 inches	55	199	387	1.2	4.1	NA
4 to 12 inches	NA	NA	249	NA	NA	NA
12 to 24 inches	39	180	10	0.5	1.3	NA
24 to 36 inches	59	116	9	0.5	0.8	NA

Notes:

1. Arsenic screening levels in mg/kg: residential = 0.39, industrial = 1.6, protection of groundwater = 0.29, background = 16.
2. Selenium screening levels in mg/kg: residential = 390, industrial = 5,100, protection of groundwater = 0.26, background = 0.07.

3. Sample locations are shown on Figure 3-7.

NA indicates that no sample was analyzed for selenium at that depth.

Table 4-2. Screening Level Values

Phase II RFI Report, East Helena Facility

Analyte	Soil					Sediment			Groundwater			Surface Water			
	Resident Soil [1] (mg/kg)	Industrial Soil [2] (mg/kg)	Background [3] Helena Valley Mean Soil (mg/Kg)	Risk-based SSL [7] (mg/kg)	MCL-based SSL [8] (mg/kg)	Benthic Invertebrates - TEC [4] (mg/kg)	Benthic Invertebrates - PEC [4] (mg/kg)	Project Sediment Screening Level Value (mg/kg)	Tapwater [5] (mg/L)	MCL [6] (mg/L)	Project Groundwater / Stormwater Screening Level Value (mg/L)	MDEQ HH Surface Water [9] (mg/L)	BERA Surface Water Chronic Total Recoverable [9] (mg/L)	BERA Surface Water Chronic Dissolved [9] (mg/L)	Project Surface Water Screening Level Value (mg/L)
Aluminum (Al)	7.7E+.04	9.9E+.05	NA	NA	NA	2.6E+04	6.0E+04	2.6E+04	3.7E+01	5.0E-02	5.0E-02	NA	8.7E-02	8.7E-02	8.7E-02
Antimony (Sb)	3.1E+01	4.1E+02	NA	6.6E-01	2.7E-01	2.0E+00	2.5E+01	2.0E+00	1.5E-02	6.0E-03	6.0E-03	5.6E-03	1.9E-01	1.9E-01	1.9E-01
Arsenic (As)	3.9E-01	1.6E+00	1.7E+01	1.3E-03	2.9E-01	9.8E+00	3.3E+01	9.8E+00	4.5E-05	1.0E-02	1.0E-02	1.0E-02	1.5E-01	1.5E-01	1.5E-01
Barium (Ba)	1.5E+04	1.9E+05	NA	3.0E+02	8.2E+01	NE	NE	NE	7.3E+00	2.0E+00	2.0E+00	1.0E+00	2.2E-01	2.2E-01	2.2E-01
Beryllium (Be)	1.5E+.02	2.0E+03	NA	NA	3.2E+00	NE	BNE	NE	7.3E-02	4.0E-03	4.0E-03	4.0E-03	1.1E-02	1.1E-02	1.1E-02
Cadmium (Cd)[10]	7.0E+01	8.0E+02	2.4E-01	1.4E+00	3.8E-01	9.9E-01	5.0E+00	9.9E-01	1.8E-02	5.0E-03	5.0E-03	5.0E-03	2.7E-04	2.5E-04	2.5E-04
Chromium (Cr) [11]	2.9E-01	5.6E+00	NA	8.3E-04	1.8E+05	4.3E+01	1.1E+02	4.3E+01	4.3E-05	1.0E-01	1.0E-01	1.0E-01	1.1E-02	1.1E-02	1.1E-02
Cobalt (Co)	2.3E+01	3.0E+02	NA	4.9E-01	NA	5.0E+01	NE	5.0E+01	1.1E-02	NA	1.1E-02	NE	2.4E-02	2.4E-02	2.4E-02
Copper (Cu)	3.1E+03	4.1E+04	1.6E+01	5.1E+01	4.6E+01	3.2E+01	1.5E+02	3.2E+01	1.5E+00	1.3E+00	1.3E+00	1.3E+00	0.009/BLM	0.009/BLM	9.0E-03
Gold (Au)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron (Fe)	5.5E+04	7.2E+05	1.5E+04	6.4E+02	NA	1.9E+05	2.5E+05	1.9E+05	2.6E+01	NA	2.6E+01	3.0E-01	1.0E+00	1.0E+00	1.0E+00
Lead (Pb)	4.0E+02	8.0E+02	1.2E+01	NA	1.4E+01	3.6E+01	1.3E+02	3.6E+01	NA	1.5E-02	1.5E-02	1.5E-02	3.2E-03	2.5E-03	2.5E-03
Manganese (Mn) [12]	1.8E+03	2.3E+04	3.4E+02	5.7E+01	NA	4.6E+02	1.1E+03	4.6E+02	8.8E-01	5.0E-02	5.0E-02	5.0E-02	1.7E+00	1.7E+00	1.7E+00
Mercury (Hg)	5.6E+00	3.4E+01	8.0E-02	3.0E-02	1.0E-01	1.8E-01	1.1E+00	1.8E-01	5.7E-04	2.0E-03	2.0E-03	5.0E-05	7.7E-04	7.7E-04	7.7E-04
Nickel (Ni) [13]	3.7E+03	4.4E+04	NA	4.8E+01	NA	2.3E+01	4.9E+01	2.3E+01	1.8E+00	NA	1.8E+00	NE	5.2E-02	5.2E-02	5.2E-02
Selenium (Se)	3.9E+02	5.1E+03	7.0E-02	9.5E-01	2.6E-01	NE	NE	NE	1.8E-01	5.0E-02	5.0E-02	5.0E-02	5.0E-03	4.6E-03	4.6E-03
Silver (Ag)	3.9E+02	5.1E+03	NA	1.6E+00	NA	1.0E+00	2.2E+00	1.0E+00	1.8E-01	1.0E-01	1.0E-01	1.0E-01	3.6E-04	3.6E-04	3.6E-04
Tellurium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium (Tl)	NA	NA	NA	NA	1.4E-.01	NA	NA	NA	NA	2.0E-03	2.0E-03	2.4E-04	1.7E-02	1.7E-02	1.7E-02
Vanadium (V) [15]	5.5E+00	7.2E+01	NA	2.6E+00	NA	NA	NA	NA	2.6E-03	NA	2.6E-03	NE	4.4E-02	4.4E-02	4.4E-02
Zinc (Zn)	2.3E+04	3.1E+05	4.7E+01	6.8E+02	NA	1.2E+02	4.6E+02	1.2E+02	1.1E+01	5.0E+00	5.0E+00	2.0E+00	1.2E-01	1.2E-01	1.2E-01

Notes:

(1) EPA Regional Screening Level (RSL) Summary Table - November 2010 for 10-6 excess cancer risk for residential exposure scenario. EPA website: http://www.epa.gov/region9/superfund/prg/

(2) EPA Regional Screening Level (RSL) Summary Table - November 2010 for 10-6 excess cancer risk for residential exposure scenario. EPA website: http://www.epa.gov/region9/superfund/prg/

(3) Background Concentrations for Inorganics in Soil. December 2007. Montana DEQ website: www.deq.mt.gov/.../BackgroundConcentrationsForInorganicInSoil.pdf

(4) Values derived from Draft Baseline Ecological Risk Assessment for East Helena Facility. Gradient. December 2010.

(5) EPA Regional Screening Level (RSL) Summary Table - November 2010 for 10-6 excess cancer risk for residential drinking water exposure scenario. EPA website: http://www.epa.gov/region9/superfund/prg/

(6) EPA Regional Screening Level (RSL) Summary Table - November 2010. Federal Maximum contaminant levels (primary and secondary) for muncipal water supply systems. EPA websites: http://www.epa.gov/region9/superfund/prg/; http://water.epa.gov/drink/contaminants/secondarystandards.cfm; http://water.epa.gov/drink/contaminants/#List

(7) EPA Regional Screening Level (RSL) Summary Table - November 2010. Soil SLV concentration calculated to be protective of risk-based groundwater concentrations. EPA website: http://www.epa.gov/region9/superfund/prg/

(8) EPA Regional Screening Level (RSL) Summary Table - November 2010. Soil SLV calculated to be protective of groundwater MCL concentrations. Federal Maximum contaminant levels for muncipal water supply systems. EPA website: http://www.epa.gov/region9/superfund/prg/

(9) Values derived from Draft Baseline Ecological Risk Assessment for East Helena Facility. Gradient. December 2010.

(10) Cadmium SLVs based on combination of water and diet (see EPA Regional Screening Level (RSL) Summary Table - November 2010).

(11) Chromium SLVs based on Total Chromium values or lower of Cr III and Cr VI values from EPA Regional Screening Level (RSL) Summary Table - November 2010

(12) Manganese SLVs based on combination of diet and non-diet (see EPA Regional Screening Level (RSL) Summary Table - November 2010).

(13) Nickel SLVs based on refinery dust (see EPA Regional Screening Level (RSL) Summary Table - November 2010).

(14) EPA Regional Screening Level (RSL) Summary Table - November 2010

(15) Vanadium SLVs based on lowest values (metallic vanadium -see EPA Regional Screening Level (RSL) Summary Table - November 2010).

SSL = values based on DAF =1

NA = not available

MCL = maximum concentration level

SLV = screening level values

HH = human health

NE = not established

TEC = Threshold Effects Concentration represents a concentration below which adverse effects are not expected

PEC = Probable Effects Concentration represents a concentration above which effects are expeted to occur more often than not

BLM = biotic ligand model

BERA = baseline ecological risk assessment

gray value selected for project SLV

blue selected project SLVs by media

Table 11-2. 2008-2010 Summary of Groundwater Standard Exceedances
Phase II RFI Report, East Helena Facility

Parameter	Groundwater Standard[(1)] (mg/L)	Total Number of Samples[(2)]	Total Number of Exceedances	% Exceedances	Exceedances in Offsite Wells?
Antimony	0.006	1104	160	14.5%	Yes
Arsenic	0.01	1453	627	43.2%	Yes
Barium	1.0	1104	0	0.0%	NA
Beryllium	0.004	1104	0	0.0%	NA
Cadmium	0.005	1364	124	9.1%	No
Chromium	0.1	1104	0	0.0%	NA
Copper	1.3	1342	0	0.0%	NA
Iron	0.3 (guidance)	1364	218	16.0%	No
Lead	0.015	1364	17	1.2%	No
Manganese	0.05 (guidance)	1364	427	31.3%	Yes
Mercury	0.002	1103	0	0.0%	NA
Nickel	0.1	1104	0	0.0%	NA
Selenium	0.05	1442	337	23.4%	Yes
Silver	0.1	1104	0	0.0%	NA
Thallium	0.002	1104	86	7.8%	No
Zinc	2	1342	38	2.8%	No

Notes:

(1) Groundwater standard from Montana DEQ (2010a)

(2) Data evaluation includes monitory wells and domestic/private wells

Data extracted from East Helena EnviroData database on 12/21/2010.

Calculations based on dissolved metals results only.

Field duplicate results excluded from calculations.

NA = Not applicable

Appendix C
Public Comments Received on the 2012 Interim Measures Work Plan with U.S. Environmental Protection Agency Responses

Lewis and Clark County
Water Quality Protection District

Lewis and Clark County
Water Quality Protection District
316 North Park, Room 220
Helena, MT 59623
(406) 457-8926 Fax: (406) 447-8398

July 16, 2012

Betsy Burns
EPA Region 8 Montana Office
10 W. 15th Street, Suite 3200
Helena, MT 59626

Re: Comments on East Helena Facility Interim Measures Work Plan

The following comments on the Former ASARCO East Helena Facility Interim Measures Work Plan – Conceptual Overview of the Proposed Interim Measures and Details of 2012 Activities (IM Work Plan - 2012) issued in June 2012 by the Montana Environmental Trust Group, LLC (METG) and opened to public comment on June 15, 2012 by the U.S. Environmental Protection Agency (EPA) are on behalf of the Lewis & Clark County Water Quality Protection District (WQPD). The Interim Measures Work Plan (IMWP) document presents the site cleanup and restoration activities for the 2012 field season. The IMWP represents the inaugural document in a planned series of annual work plans to be presented for public comment each year, until completion of all remedial actions related to the former Asarco facility (site) in East Helena, Montana . This and future work plans provide a method for stakeholder input into planned activities for each year. Based on previous site management methods, and site activities to date, active stakeholder (public) participation at the site is limited to public comments on these work plans. Additional documents, such as the Phase II Remedial Facility Investigation Report (Phase II RFI) currently in *draft* form, and the completed Corrective Measure Study (CMS) are expected to be made available for public comment as well. In addition to specific site activities, the IMWP presents an overview of proposed interim measures designed to mitigate contaminant source areas. These interim measures are somewhat comprehensive, and will require several years for full implementation. WQPD staff concurs that site activities for 2012 represent preliminary actions necessary to move forward with long-term site cleanup. These comments were prepared by separate staff members and compiled for submittal under a single cover, and some redundancy may be present.

General Comments

1. The IM Work Plan 2012 describes three distinct corrective actions to be undertaken to reduce the migration of contaminants in groundwater. The three proposed interim measures South Plant Hydraulic Control (SPHC), Evapotranspiration Cover System (ET Cover), and Source Removal contains a complex series of actions that are interdependent and will transform the former ASARCO smelter site. Individually these actions appear to meet the definition of "interim

measures" under RCRA, however when viewed as a whole, the actions described in this work plan appear to be the entire corrective action for the former smelter site. These actions preclude any other potential remediation efforts that could be taken at the site and would become the "de facto" final corrective measure for the smelter site cleanup. The WQPD finds this to be troubling since the next step under the RCRA process at the site will be the development of a Corrective Measures Study based on the findings of the RCRA Facility Investigation (RFI) that leads to a "Statement of Basis" for the selection of corrective measures with their design and implementation. The IM Work Plan and proposed schedule of implementation of these IMs over the next three year (2012 to 2015) short circuits that process of selection of the corrective measures. The site has had a RFI Phase II prepared since 2011 that is in fact the stated basis for much of the decision contained in the IM Work Plan, but that document has yet to be approved by EPA and released to the general public for review and comment. EPA itself has raised questions regarding the completeness of this document. The IM Work Plan – 2012 proposes a multitude of actions and decisions on cleanup of the site that have never been explained in an alternatives analysis and there are no costs reported in the document under review, precluding any cost/benefit analysis of these actions compared to other suggested remedial activities. Examples include the decision to demolish site buildings rather than redevelopment of the site, moving Prickly Pear Creek (PPC) away from the slag pile rather than re-contouring the slag pile in the vicinity of the creek, and so on. We are not suggesting that the decisions are not necessarily appropriate, it is just they have not been explained and the public has not been given an opportunity to be involved in those planning efforts as envision in a RCRA public process.

2. The IM Work Plan – 2012 is predicated on the assumption that the SPHC actions will result in lowering the groundwater elevation in the plant area, reduce hydraulic gradients across the site, decrease groundwater flow velocities and decrease the contaminant mass flux leaving the site to the north in a downgradient direction. This result expected from the removal of Lower Lake, elimination of Upper Lake, lowering of Upper Lake Marsh and conversion of those areas to a palustrine emergent wetland and the relocation of PPC with the removal of the smelter dam is critical to the implementation of the other IMs. Capping the plant site without removal of contaminated hazardous materials if the water level is not reduced completely, will not result in cleaning up the source of groundwater contamination. The reduction of groundwater levels projected by the Preliminary Evaluation South Plant Hydraulic Control (GSI, 2011) predicted a significant greater groundwater drawdown then was demonstrated during the limited testing reported in the IM Work Plan – 2012 conducted from October 2011 through February 2012. This is a prime example of the insufficient data utilized throughout this plan in justification of the proposed interim measures. The Preliminary Evaluation report used one year of surface water flow measurements and limited groundwater levels to provide an analysis with a stated level of significant uncertainty. The METG has attempted to fill that lack of data from its testing but again that lacks the time and seasonal variability to be confident in predicting that the measures will actually achieve the desire result.

3. Of particular concern is the lack of evaluation of the water levels response to the varied levels of spring runoff of PPC and periodic flooding. If the groundwater elevations are periodic increased this would negate the justification for the SPHC if the contaminated materials left on site are re-saturated and contaminates are remobilized during these times. The low permeability fill barrier to be constructed north of the former location of Lower Lake is intended to try to

address this possibility. But to be effective the fill barrier would need to be keyed into the Tuff layer which may or may not be found at this location, be physically continuous in its lateral extent, and at a depth that would allow the fill barrier to constructed most likely in saturated conditions. Again a great deal of uncertainty and risk.

4. To proceed with the project without the data to provide some assurance of success of the final outcome is unsupportable particularly when the other measures undertaken are dependent on that outcome of the hydraulic controls. One can say that the use of adaptive management is appropriate here, however, these measures are so expensive, interconnected, and scheduled to be implemented is such a short time frame that there will be no opportunity for adaptive changes once the Source Removal actions are competed and the ET Cover has been placed with the potential of a CAMU holding hundreds of thousands of cubic yards of hazardous wastes permanently located on the smelter site.

5. The timeline of the implementation of the proposed Interim Measures in the IM Work Plan – 2012 is excessively fast to the point of being hasty lacking the appropriate time to carefully plan, consider specifics of design and alternative opinions and ideas, and the short design period drives up the costs by pushing engineering consulting services beyond normal time frames for designing these types of projects (i.e. siting and design of a CAMU, wetland removal and restoration, stream relocation design and implementation and a large scale ET cover, etc.). It also eliminates any meaningful public input and review.

6. Some specific actions if one accepts the decision to cap the plant site based on the plan are appropriate and acceptable. The plan for an ET Cover is a valid technology for capping the plant site materials. The WQPD would hope that the specifics of the design of the ET cover would be available for review and input prior to final design and implementation. The conceptual design found on page 2-11 of the IM Work Plan – 2012 is acceptable if the ET Layer is 24 to 32 inches as a conservative approach to this permanent feature. The ET Cover of a CAMU would also be acceptable with a conservative approach by adding a protective membrane at the base such as a geosynthetic clay liner.

7. We cannot support the proposed change of the specified location of the third CAMU from the Tertiary bench west of the plant site as originally proposed by ASARCO and approved by EPA as the most groundwater protective location because of its low permeable soils and geology. Placing the permanent repository of hazardous materials excavated from Tito Park, under Lower Lake, and other onsite removals in the alluvial historic floodplain of PPC is an unacceptable risk for an economic reason. This repository must contain the toxic material into perpetuity and the first priority should be placement in the most secure location utilizing the natural conditions to aid that protection of human health and the environment. Placement in the LOSA would require all the protection to the underlying groundwater be based on engineered design features which cannot be guaranteed to not to fail and indeed are likely to fail sometime in the future.

8. The relocation of Prickly Pear Creek to the east onto the Tertiary bench is a major undertaking of its own right. Again the timeline is insufficient to take the time to properly generate a design with consideration of the issues identified in the IM Work Plan – 2012, but also planning for future uses, community values, sediment control with removal of the dam,

appropriate reference reaches to mimic a natural stream channel to deal with the large gradient change in the areas before the railroad bridge, and potential economic opportunities (i.e. kayak park, and other recreational options). This action necessitates a public involved planning process and appropriate outside professional review than is projected by the timeline proposed in this work plan.

9. The WQPD does not object to the 2012 objectives of the Work Plan of construction of a prefabricated bridge structure over Smelter Dam and the relocation or abandonment of utilities located on the east tertiary bench. Demolition of building and infrastructure in the Lower Ore Storage (LOSA) would be appropriate if there was a clear justification for not proceeding with redevelopment of the plant site. We also can accept the future needs to excavate wastes from Tito Park, Lower Lake and the eventual removal of Smelter Dam, but the EPA and METG must do more to provide public input in a timely and meaningful process with justifications for the alternatives that were dismissed.

10. The IMWP provides a comprehensive conceptual overview of proposed interim measures, or remedial actions, to be implemented at the site. Use of the term interim infers that these actions may or may not be part of the final remedy for the site, and that the subsequent assessment of remedial alternatives for the site may result in separate remedial actions. However, the interim measure remedial actions all require significant engineering design and long-term planning for implementation. The scale of these actions will result in them being incorporated into the final remedial actions for the site, to be determined with the release of a *draft* CMS, public comment, and then a final CMS which addresses public comments. The selection of final remedial actions requires meaningful public participation consistent with RCRA guidelines. The current approach for implementation of interim measures circumvents the public process required for the selection and implementation of appropriate remedial actions for the facility.

The proposed interim measure remedial actions should be based on the technical assessment of the nature and extent of contamination at the site as presented in the Phase II RFI. Unfortunately, the Phase II RFI has not been finalized, nor has it been submitted for public review and comment. The final Phase II RFI should present a comprehensive understanding of the site, including identification of the physical processes associated with migration of contaminants away from the site as exposure pathways to both human and environmental receptors.

11. Recent public presentations have noted that the RCRA site process reflects meaningful public involvement with consideration of the concerns of all stakeholders. The interim measures proposed for the site are comprehensive, costly, and will be part of the final remedial actions implemented for the site. Since they will be part of the final solutions, the implementation of them should be included in the site Corrective Measures Study (CMS). Reviewing the cost-benefit relationship for these actions, compared to other potential alternatives, will help ensure that they represent the best remedial alternatives for long-term site restoration. Incorporation of them into the CMS will also allow for public comment on the proposed actions as meaningful involvement of stakeholders.

12. The IMWP represents the first document where public comments may be submitted on the work activities conducted for the site. As such, the document should be considered "stand-alone" and provide sufficient information for the public, or technical representatives of the public, to complete a technical review of the proposed activities. From this perspective, the IMWP is incomplete since it refers to information in the Phase II RFI, which has not been finalized, and references a number of site documents that have been completed. Unfortunately, the majority of these documents, including the Phase II RFI, have not been made available to the public. As a result, comprehensive technical reviews of proposed actions are limited at this time. Further, the IMWP presents only limited amounts of actual data, and relies on "conceptual models" for understanding of the proposed actions. The need for these actions should be presented with actual data to support the need for activities. Also, any technical document referenced as providing baseline information on the site should be made available for public review.

13. Interim measure actions under RCRA are generally needed to mitigate existing high risk levels from contamination by eliminating exposure pathways and/or by stabilizing conditions in unstable source areas. These interim measures will not have any immediate results for either of these factors. While the proposed activities for 2012 are necessary for long-term remediation of the site, the necessity for the followup actions in subsequent years should be considered in the CMS.

14. The south plant hydraulic control (SPHC) interim measure reflects a conceptual model where the majority of ground water flowing through the site is derived by loss from Lower and Upper Lake(s). Unfortunately, the long-term water level database has only semi-annual data. As a result, there is little baseline data available to characterize how hydrologic conditions would be expected to fluctuate seasonally. Wells monitored quarterly in East Helena by WQPD staff from 1990 until 2005 show potential seasonal fluctuations of twenty feet or more (GWIC IDs 892188, 892177). The magnitude of the seasonal fluctuation of water levels at the site is unknown at this time, and should be determined for proper evaluation of the effects of the SPHC system. The current assessment, prepared by GSI and not made available to the public, provides only a qualitative review of conditions.

While efforts have been made to obtain more frequent data during the last year, the collected data reflects recharge and regional conditions of a very high water year from a large snowpack during the 2010-2011 winter, and spring/early summer precipitation. Water levels have been observed at near historic high levels in both bedrock and alluvial wells around the Helena Valley. As a result, the ground water level database used to characterize conditions for the SPHC are not representative of general conditions in the area observed over the past decades. Design criterion for the SPHC needs to reflect actual data characterizing the hydrologic system so that the potential drawdown effects can be better predicted.

15. The current site hydrogeologic conceptual model identifies Prickly Pear Creek as the only source of ground water to the system. While this makes the modeling process easier, the resulting model may not be representative of actual conditions. For the Seaver Park area, ground water temperature, major ion water quality and water isotope data suggest that recharge occurs from the underlying bedrock system. This water source provides sufficient recharge for wells

utilized by residents in this area, confirming that bedrock recharge is significant. This is consistent with conclusions derived from the regional water balance for the area from the USGS Report on the Hydrogeology of the Helena Valley (Briar & Madison, 1992). Since subsurface recharge to the alluvial aquifer system represents a significant component of recharge, especially during winters months when surface flows limit recharge, bedrock flow should be considered in the conceptual model, and the numeric ground water flow model.
For the SPHC and the area upgradient (south) of the upper/lower Lakes and major sources of ground water contamination, there is no data characterizing upgradient hydrologic conditions. Is there a component of bedrock recharge upwelling into the stream system? This type of recharge may limit the effectiveness of the SPHC system. Additionally, as evidence by the extremely high permeabilities of sediments on the site, there is a potential for the Prickly Pear Creek valley to have high permeability alluvial materials filling the valley upgradient of the site – beneath the lakes and further upgradient. There is no data addressing this. Such an alluvial aquifer, in communication with the stream further upgradient, would still transmit water through the system independent of the change in conditions induced by draining the lakes. This represents another background condition that should be clarified, with data, to fully understand the potential impacts of the SPHC to the site.

16. Water table maps for the site generally show local water conditions from a single aquifer. The maps should depict the limits of the high conductivity alluvial aquifer which is present in the site, with boundaries against other geologic units (see Stickney, 1987). The Tertiary volcanicastic sedimentary unit to the west has significantly different hydrologic properties, with ground water flow as recharge to the alluvial system. Data characterizing both geology and hydrologic conditions on the east bench has not been made available to WQPD staff. Regardless, the hydrogeologic assessment should delineate and characterize the different aquifer systems present for the site.

17. The disposition of the volcanic tuff as a discrete unit should be confirmed. The volcaniclastic sediments west of the site were observed during drilling as thick, continuous sequences of a lapilli-tuff type ash layer. This type of deposit occurs proximal to volcanic sources with relatively rapid deposition of the ash layers. The geotechnical borings for the US12 overpass indicate that this unit, as a volcanic ash, has a thickness of 100 feet or more. These deposits represent a series of intense volcanic eruptions, with sediment layers potentially present separating thick ash sequences from each event. The sedimentary layers may then transmit water. The disposition of the single "ash" layer at the site should be verified since it is integral to the site hydrogeologic conceptual model.

The ash layer downgradient from the site is actually a clay-rich sedimentary unit, with clasts of the ash within it. While similar, this is not the same unit and there is no reason to expect it to be continuous with the ash observed onsite.

18. A regional background level for Arsenic is indicated on Figure 3-8 and 3-9 as 17 ug/L. There is no indication for how this concentration was determined. WQPD well data would not support this conclusion. The background level for this type of site should be determined based on site-specific upgradient conditions.

19. Figure 2-8 indicates the expected potentiometric surface after initiation of the SPHC. The methods used to complete this figure are not explained. The use of the figure is misleading, since there is no way to predict the impacts of SPHC without using a properly calibrated numerical model which accounts for all components of the hydrologic system.

20. The discussions regarding the source excavation do not indicate the water level, or that dewatering of the system will likely be needed to access deeper soils. The dewatering method should be indicated, with methods to manage the contaminated water.

Closing

Any further review of the proposed interim measures is not possible without the availability of specific designs and the specifications of the materials to be used in those actions not presented in IM Work Plan - 2012. Please contact me if you would like to discuss any of the comments, especially related to the technical issues. WQPD staff, as previously indicated, would be happy to assist with the technical components of the assessment of site and downgradient ground water conditions.

Sincerely,

James Swierc
Hydrogeologist
Lewis & Clark County
Water Quality Protection District

CC: Cindy Brooks, METG
Lewis & Clark Commissioners
Melanie Reynolds, L&C Co. Health Officer
City of East Helena Mayor & City council

James Schell

Date: July 16, 2012

Subject: Public Comments - EH Draft 2012 IM Work Plan

To: Betsy Burns
EPA Region 8 Montana Office
10 W. 15th St.
Suite 3200
Helena MT 59624
burns.betsy@epa.gov

From: James Schell
Box 1610
East Helena MT 59635-1610
jamie@schell.net

Thank you for the opportunity to comment on the well written and very comprehensive East Helena Draft 2012 Interim Measures Work Plan.

These comments were produced using the *Final Draft Former ASARCO East Helena Facility Interim Measures Work Plan - Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities* document dated June 2012. (source)

The following comments are my own and may not represent the opinions or comments of the City of East Helena or the East Helena City Council.

Residents of East Helena, myself included, are naturally concerned about the extensive amount of upstream work that the Montana Environmental Trust Group is doing to and along Prickly Pear Creek (PPC). Understandably, being downstream, these concerns include future increased sand/sediment movement, groundwater level changes, flood impacts, and contaminant migration.

General Comments

Comment #1
Included in the SPHC IM section 2.1.3 (Benefits) on page 2.2, dot point two, is the statement: "Decreased Sediment Load to PPC". I believe this statement to be misleading and could be misconstrued. While it is true that the planned measures will decrease slag sediment transport downstream, nothing presented in the Draft IM that I noticed discusses the possible increase of other sediment transport or nutrient fluxes due to the removal and non-loading of the Smelter dam. In my opinion, the statement should include the word "slag".

Comment #2
Included in the SPHC IM section 2.1.4.2 (Additional Evaluation of Groundwater Potentiometric Surface) on page 2-3, in the second paragraph, are the statements: "As can be seen, an overall drop in groundwater elevations is expected[.]" and "Reduction in groundwater level decreases with increasing distance from the South Plant area."

While Figure 2-7 and Figure 2-8 outline dated and estimated potentiometric mapping for November, I believe a statement and/or data regarding analysis of high water months should also be included.

Inclusion of a statement and potentially additional months' data, for example high water months, would give the reader confidence that year-round on and off-site groundwater levels will be reduced (or not reduced) where expected.

Additionally, I believe that quantifying the distance of the reduced groundwater levels from the site would give readers a better understanding of where the reduction in levels can be expected to cease.

Comment #3
Section 2.1.4.4 (Groundwater Flow and Contaminant Transport Modeling) on page 2-4 contains a paragraph explaining the upcoming completion of initial flow models, calibration, scope, and schedule regarding groundwater and contaminant transport.

In my opinion, the East Helena Final 2012 Interim Measures Work Plan, scheduled for release later this year, should include mention of an estimate of the amount of water being diverted from the site that will flow downstream. With the additional water flowing downstream that is not recharging the site's aquifers, quantification would give the reader confidence that these interim measures will not potentially effect ground and surface water negatively downstream if this is indeed the case.

Comment #4
Dot point nine in section 4.1 (Summary of Existing Data) on page 4-1 states: "Sediment chemistry – Completed. Data are summarized in the draft Phase II RFI Report. Limited additional data may be needed in Lower Lake and PPC upstream and downstream of Smelter Dam to support detailed engineering evaluation. These data needs are currently being evaluated."

Additionally, the second dot point in section 4.2 (Additional Data Required for 2012 Work) on page 4-2 only addresses upstream data: "Sediment chemistry upstream of Smelter Dam".

In my opinion, current sediment toxicity measurements upstream and downstream should be obtained to supplement the Phase II RFI Report data. If no additional downstream and/or upstream sediment chemistry measurements are obtained, inclusion of the reasons why these data were omitted should be addressed.

Comment #5
Appendix A outlines the ongoing Upper Lake Drawdown Test and states that the drawdown test results and interpretation release is scheduled for 2012 in a detailed technical memorandum.

I believe that these test results and interpretation, including all collected data such as PPC flow measurements and turbidity studies, should be included in the East Helena Final 2012 Interim Measures Work Plan, perhaps as an Appendix. Including this information in the Final 2012 IM, as opposed to a separate document, would help readers better understand the measures and the motives behind them.

Additional/Minor Comments

Comment #6
Dot point three on page 2-5 of section 2.1.4.6 (Natural Resources) lists the *Existing Conditions Stream Assessment, Prickly Pear Creek, East Helena Smelter RCRA Site* document date as December 2, 2011. Copies of Final Report of this document were distributed to the City of East Helena and are dated January 27, 2012, not December 2, 2011. See also section 2.1.5.2 (first dot point) as well as section 4.1 (sixth dot point).

Comment #7
The second sentence in the fourth paragraph on page 3-4 of section 3.1.5 (Nature and Extent of Soil Contamination) contains the wording ".... and other areas of East Helena proper performed under CERCLA." I believe the word "proper" should be replaced with "properly".

Comment #8
The sentence just preceding the two final dots points on page 6-2 of section 6.1 (Application of Area of Contamination Policy and CAMU Rule) contains the wording ".... and eventually the new CAMU 3 will be used do the following:". I believe the word "to" should precede the word "do" in this sentence.

Comment #9
The sentence just after Table 2-2 on the third text page of Appendix A contains the date "October 31, 2001". I believe this date should be "October 31, 2011".

Comment #10
The second sentence in the final paragraph on the third text page of Appendix A contains the date "2/21/11". I believe this date should be "2/24/11" to match the two accounts of this date on the previous page and Figure 4 of the same appendix.

Thank you very much for your attention to these comments and please let me know if you have any questions.

Lewis and Clark City-County Health Department

LEWIS & CLARK CITY-COUNTY
Health Department

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July 13, 2012

Betsy Burns
EPA Region 8 Montana Office
10 W 15th Street, Suite 3200
Helena, MT 59626

RE: Comments on 2012 Interim Measures Work Plan

Dear Ms. Burns:

Thank you for the opportunity to provide comments on the Former ASARCO East Helena Facility Interim Measures Work Plan – Conceptual Overview of the Proposed Interim Measures and Details of 2012 Activities (Work Plan, June 2012, Montana Environmental Trust Group, LLC (METG). The projected work is ambitious and many elements of the work plan seem reasonable, but data upon which these plans are based seems uncertain, with several notable gaps. Key concerns of the Environmental Division of the City-County Health Department include modification of the Prickly Pear Stream channel, disposition of soils excavated from the stream channel and bypass work areas, long-term management of sediment, and the completeness and reliability of data upon which Interim Measures are based. There is a sense that the timeline seems rushed and more aggressive than the site demands, considering the data gaps that are noted and the questions that remain on many aspects of the project. More detailed comments follow.

1. The Data used in the Work Plan is based in part on the draft Phase II RCRA Facility Investigation Report (RFI), GSI Water Solutions, Inc., 2011. The vast amount of data in the RFI and its organization makes it difficult, if not impossible, for the County or the public to understand what data were used for the development of the Work Plan. It is also difficult to identify whether adequate data has been collected to support the decisions made in the Work Plan. The information in the RFI has not been publically presented or explained.

2. The Work Plan itself identifies the data being used as uncertain, qualitative and even lacking. Section 2.1.4.1, Page 2-3, paragraph 1 states that GSI conducted a *"…qualitative evaluation to provide insights on the extent to which SPHC IMs might reduce groundwater levels and hydraulic gradients within the former Smelter site, and to identify the types of information and analysis necessary to evaluate the potential more rigorously"*. Further reading in this section indicates that GSI thought that SPHC IMs **would likely** lower groundwater levels, but that there were uncertainties including a *"… lack of geologic and*

groundwater data farther to the east of the former Smelter site, making it difficult to predict if seepage from a realigned creek…," might migrate back toward the Smelter site. Since the Smelter site is also the general location of the CAMU unit being proposed, and the site is also the location of the slag pile, both of which are probable sources of contamination to groundwater, it seems reasonable that prior to taking any major engineering steps which result in unpredictable outcomes, more groundwater level data should be collected: specifically, one full year including high water season which is typically from April through October in this area. Without such information, the successful outcomes of the projects identified in the Work Plan are questionable.

3. The expansion of the Prickly Pear Floodplain and Floodway are important components of the proposed IMs. We applaud this effort, although we disagree with some details. For example, the timeline for the relocation of Prickly Pear Creek to the east onto the Tertiary bench is does not allow time to properly generate a design which incorporates planning for future uses, community values, sediment control with removal of the dam, appropriate reference reaches to mimic a natural stream channel to deal with the large gradient change in the areas before the railroad bridge, and potential economic opportunities (i.e. kayak park, and other recreational options). This action necessitates public involvement in the planning process and appropriate outside professional review. Many local organizations, including the Prickly Pear Land Trust, the City of East Helena and Lewis and Clark County are interested in this concept. Why are opportunities to provide restoration and redevelopment not being incorporated at this early stage?

4. Will the flood plain modeling include review and analysis of predicted sediment transport after proposed stream relocation is complete? This topic is of particular interest to the county. While the natural state of Prickly Pear Creek may be one of periodic sediment transport, Prickly Pear Creek has not been 'natural' for over 100 years. Naturalizing the creek at this point in time may represent a threat to the City of East Helena and may ultimately be a greater risk than implementing a less 'natural' alternative that includes some extension of the length of the stream with meanders, and/or some sediment 'trap'.
5. Much of the work proposed in this work plan seems to be based on the assumption that returning the stream to something resembling its natural state is desirable, but due to decades of abuse, this section of the stream may best be handled in a different manner. Have alternate plans, such as moving the slag pile, been analyzed? Are those analyses available for public review?
6. During the excavation activities planned for the 2012 work year, what kinds of construction BMPs will be used to limit or reduce the wind-borne dust and erosion of contaminated soils? Is the safety plan available for review, and if not, can a copy of the plan be maintained in the East Helena City Hall?
7. The last paragraph of section 2.1.5.1, page 2-6, states that construction of the temporary bypass will result in the excavation of approximately 260,000 cubic yards of material. The plan is to reuse this material in other IMs at the site, including the ET cover. Will this material be sampled for contaminants before and during excavation? If the material is contaminated, will it still be used in other IMs? Is there a trigger level at which the materials would be rejected for reuse?
8. Section 2.1.5.2, last paragraph, notes that construction is expected to result in the excavation of 250,000 to 300,000 cubic yards of material which will be reused on site. As

with #7 above, will sampling be conducted and appropriate disposition of soil be made based on sampling results?

9. From the document, it appears that approximately 510,000 to 560,000 cubic yards of materials will be excavated for reuse, and an additional 600,000 will be imported from offsite sources. Are there plans to treat potentially contaminated onsite soils by mixing with offsite soils, thereby diluting contamination levels?
10. Has the area designated as the site of the Prickly Pear Creek bypass and new stream channel been evaluated with soil test pits and sampling? Have soil profiles been established, and depths of reusable soil been established?
11. The proposal to use an ET cover system is laudable. The addition of a geosynthetic membrane for use in areas of high contamination levels, such as the CAMUs, would add an extra level of protection. Has this been considered, and if so, what conclusion was reached?
12. Approximately 500,000 cubic yards of soil is proposed to be reused from the construction of the creek bypass and new stream channel. If the soils are inadequate in type or volume for this use has an alternate source of soil been identified, in additiona to the 600,000 cubic yards you are proposing to bring in from Valley View Landfill? While large volumes of 'materials' are scheduled to be excavated onsite, that doesn't necessarily indicate they are appropriate for use in the ET cover. Additionally, screening the soil and construction techniques can damage soil structure, making it unsuitable for some purposes. Has this been taken into consideration? It seems appropriate that more information about soils be collected and shared with the public prior to finalizing the plan to reuse onsite soils for an ET cover.
13. What is the final CAMU Rule, mentioned in Section 2.2.3? Where can the rule be read?
14. Section 2.2.4, the first bullet item, states, *"Vegetated Layer (8 inches) – Select fill with minimum with organics, …."* The sentence does not make sense.
15. Does the term, 'select fill', used in Section 2.2.4, have a definition? If so, please provide it.
16. Section 2.3.2 describes plans to conduct source removal and interment of excavated materials into CAMU 3. We support this removal and placement of the soils into a CAMU, although we question the location of CAMU #3 in the LOSA, where it will be in closer proximity to groundwater .
17. Section 2.3.4 discusses the plans to remove potentially saturated soils from Lower Lake and Tito Park. Are there plans to drain or dry soils prior to interment into a CAMU?
18. The Wilson Ditch/pipe runs along the area proposed for the CAMU unit and ET cover system. Will there be a setback between the CAMU and ET cover and the ditch/pipe, or will the ditch/pipe be moved to a new location?
19. Page 5-3 Section 5.1.2.2 – The first two bullet items use acronyms that are not listed in the Acronyms and Abbreviations page. They are HSP and ACM. Please provide a definition.
20. Section 6, page 6-1, last paragraph, notes that areas of continuous contamination meeting the definition of a RCRA facility extend beyond the proposed AOC boundary. Why has the AOC boundary been shrunk to exclude the areas that soils with potential lead concentrations of 1,000 mg/kg and potential arsenic concentrations of 100 mg/kg? The exclusion of this area contradicts the AOC policy as presented in Section 6.1. We disagree that the AOC boundary should be reduced in this manner.
21. The basis for determinations on the AOC in Section 6 is information from the Phase II RFI. Page 6-1, last paragraph states, "*Further, as can be seen in Section 6 of the draft Phase II*

RFI, more recent sampling confirms the presence of constituents of concern (COCs)…." Using the draft RFI with questionable data seems imprudent. Sampling of the area should be conducted prior to making a decision on what area should and should not be considered part of the facility. Rationale for the selected area appears arbitrary. Based on Figures 5-3 and 5-4 of the ROD, the area should be larger.

22. Are only Trust lands considered for inclusion in the RCRA facility AOC? If slag is encountered on other property in Prickly Pear Creek, will that property become part of the RCRA clean up?
23. The text in Section 6.2.4 notes that during building demolition, materials will be recycled as appropriate. We support this action.
24. Table 8-2 indicated that the public comment period for the interim measures work plan is through August 1, 2012. That error should be corrected in the final document.
25. Section 8.4.2 notes that work began on the Prickly Pear Creek temporary bypass in April of 2012. This action is of significant interest to the county and to the public. It seems to be reducing the opportunity for public input to a level that is not timely or meaningful. The concept design is noted as being essentially complete, and again, seems to make any public comment meaningless. Public input on the plans for the site should be heard prior to work beginning.
26. While these measures are only interim, they also commit EPA and the METG to a course of action that is hard to change in the future. Certainty now can reduce long term costs. While both EPA and the METG have expressed a commitment to moving forward with the cleanup, we feel that there sufficient questions and data gaps that work should be postponed for 6-9 months to provide time for collection of adequate groundwater level data for at least a 12-month period, and more opportunity for public input into the proposed actions, as noted in #25 above. Further we believe that as changes to Prickly Pear Creek occur, recreation and redevelop should be incorporated into the project design and Work Plan. We hope that EPA will consider a modification of the Work Plan to incorporate such changes.

Thank you again for the opportunity to provide comment on this important project. We appreciate the hard work and commitment you have demonstrated in your efforts to identify and implement effective cleanup strategies for this very difficult site.

Sincerely,

via email

Kathy Moore, R.S.
Environmental Services Administrator
Lewis and Clark City-County Health Department

Cc Melanie Reynolds, L&C County Health Officer
Lewis and Clark County Administrative Officer

State of Montana
(Montana Department of Justice and Montana Department of Environmental Quality)

DEPARTMENT OF JUSTICE
NATURAL RESOURCE DAMAGE PROGRAM

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July 16, 2012

Betsy Burns
Remedial Project Manager
US Environmental Protection Agency
10W 15th Street, Suite 3200
Helena, MT 59601

RE: Comments on IM Work Plan – Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities

Dear Ms. Burns:

The State of Montana, through the Montana Department of Justice and Department of Environmental Quality, is submitting the following comments on the Former ASARCO East Helena Facility Interim Measures Work Plan – Conceptual Overview of Proposed Interim and Details of 2012 Activities (IM Work Plan), submitted by the Montana Environmental Trust Group, dated June 2012. EPA has solicited comments on the proposed interim measures.

1. Inadequacy of Interim Measures process. The IM Work Plan states, "The purpose of this Interim Measures Work Plan …is to provide information to support U.S. Environmental Protection Agency … *conceptual* approval of three interim measures … proposed for the East Helena Facility ..." (emphasis added). In the Interim Measures Work Plan, site-specific design information and performance standards are limited or not included for the interim measures. The State of Montana maintains that due to the breath of the proposed corrective action alternatives, these alternatives are best managed through a conventional RCRA Corrective Measures Study. The IM Work Plan states, "The IMs will be evaluated as part of the Corrective Measures Study (CMS) process to determine whether they satisfy the remedial action objectives and remedy evaluation criteria for final remedies at the Facility or whether additional measures will be needed." The State is concerned that the IM implementation schedule set forth in the IM Work Plan will lead to a CMS analysis that is non-substantive in nature, as the IMs will already be implemented by that time, and are of a permanent nature. For example, the State believes further details and analysis are necessary for the nearly site-wide ET Cover System IM and the Source Removal IM, including the CAMU #3 and the proposed location at the Lower Ore Storage Area (LOSA), presently presented as conceptual interim measures. The State maintains that a CMS should be developed now, which analyzes the RCRA alternatives. EPA instead proposes a 2015 CMS schedule.

The State believes there is currently insufficient information to support locating the CAMU at the LOSA, given that the design, construction, and post-closure care requirements have not been provided. The State believes it is the best interest of the project to have a deliberative evaluation of the proposed landfill location, landfill design, and of the soils to be removed and placed in a landfill. This type of evaluation is commonly included in a RCRA CMS.

2. Delineation of RCRA Area of Contamination. The State strongly disagrees with METG's delineation of the RCRA Area of Contamination (RCRA AOC). Such an expansive RCRA AOC goes well beyond what would be permitted by the State within the State of Montana through its RCRA Corrective Action program. The justifications provided in the IM Work Plan for this expansive RCRA AOC are neither logical nor appropriate. The State will continue to advocate that the RCRA AOC remain the smelter facility boundary.

3. Background levels. The State disagrees with METG's use of 0.017 mg/L for the background level of arsenic, as set forth in Figures 3-8 and 3-9. Background is much lower, as demonstrated by the figures themselves, and other data the State has shared with METG.

4. PCB disposal. The IM Work Plan states that PCB contaminated materials will be placed in the CAMU or transported to an appropriately permitted offsite landfill. The State recommends to EPA that PCB contaminated material be shipped off-site for disposal. The State maintains its concern that onsite PCB disposal may complicate any future corrective action if the CAMU #3 fails and may increase the long-term monitoring cost of CAMU #3.

5. Corrective Action Plan requirements. Paragraph 14 of the 2012 RCRA Consent Decree requires that the IM work plan be "no less comprehensive than the IM Work Plan described in the [Corrective Action Plan]." Required sections of the Corrective Action Plan (CAP) IM Work Plan, found in CAP, Appendix E, include the following sections: an evaluation of interim measure alternatives (#3), which should list, describe, and evaluate, interim measure alternatives that have the potential to stabilize the facility, among other requirements; design basis (#8), site plan showing preliminary plant layout and/or treatment area (#10); tables listing number and type of major components with approximate dimensions (#11), and tables giving preliminary mass balance (#12). In addition, the State believes the 2012 work plan does not adequately include the following elements, based on the CAP language: description of interim measures (#4) and data sufficiency (#5). Please add these sections to the work plan.

6. Discovery of unusual materials or substances. The IM Work Plan states that if unusual materials or substances are encountered, it will either be sampled to identify the material and make an appropriately protective management decision, or it will be placed in the CAMU. The State recommends that any unusual materials or substances be characterized prior to disposal in the CAMU #3 to protect the CAMU liner system, to prevent additional post-closure monitoring costs, and to prevent additional cost in future CAMU #3 corrective action, if necessary.

7. Lower Ore Storage Area design, monitoring, and performance standards. The State maintains that the IM Work Plan should provide information on how success of the SPHC IM will be measured. The IM Work Plan should include preliminary monitoring plans.

8. ET Cover System design, monitoring, and performance standards. Site specific design and performance standards for the ET Cover System IM were not included in the IM Work Plan. Capping may be presented as an interim measure, but the expectation of the IM Work Plan is that it will likely become a large portion of the site's final remedy. Therefore, the State maintains site-specific design information and performance standards should be included in a document available for public review and comment.

9. CAMU design, monitoring, and performance standards. Site-specific design and post-closure monitoring requirements for the CAMU were not including in the IM Work Plan. Construction of a RCRA landfill is a permanent corrective action. The State maintains design information, performance standards, and a long-term monitoring plan must be included in a document that is available for public review and comment.

10. Cost information. The State maintains that the public should have been informed of the estimated costs of the proposed interim measures in the IM Work Plan, as this could have significantly influenced public comment.

11. Referenced draft Phase II RFI Report. It should be made clear that the Phase II RFI Report remains in draft, and will be released at a later date.

12. References. The IM Work Plan should include a reference section.

Thank you for your consideration.

Sincerely,

Robert G. Collins
Supervising Assistant Attorney General

cc: Denise A. Kirkpatrick, Montana Department of Environmental Quality
Cynthia Brooks, Montana Environmental Trust Group LLC, PO Box 1230, East Helena, Montana 59635

U.S. Environmental Protection Agency Responses to Comments

8/27/2012 - EPA RESPONSE TO LEWIS AND CLARK COUNTY WATER QUALITY PROTECTION DISTRICT (WQPD) COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – CONCEPTUAL OVERVIEW OF THE PROPOSED INTERIM MEASURES AND DETAILS OF 2012 ACTIVITIES*, SUBMITTED ON 7/16/2012.

July 16, 2012

Betsy Burns
EPA Region 8 Montana Office
10 W. 15th Street, Suite 3200
Helena, MT 59626

Re: Comments on East Helena Facility Interim Measures Work Plan

The following comments on the Former ASARCO East Helena Facility Interim Measures Work Plan – Conceptual Overview of the Proposed Interim Measures and Details of 2012 Activities (IM Work Plan - 2012) issued in June 2012 by the Montana Environmental Trust Group, LLC (METG) and opened to public comment on June 15, 2012 by the U.S. Environmental Protection Agency (EPA) are on behalf of the Lewis & Clark County Water Quality Protection District (WQPD). The Interim Measures Work Plan (IMWP) document presents the site cleanup and restoration activities for the 2012 field season. The IMWP represents the inaugural document in a planned series of annual work plans to be presented for public comment each year, until completion of all remedial actions related to the former Asarco facility (site) in East Helena, Montana. This and future work plans provide a method for stakeholder input into planned activities for each year. Based on previous site management methods, and site activities to date, active stakeholder (public) participation at the site is limited to public comments on these work plans. Additional documents, such as the Phase II Remedial Facility Investigation Report (Phase II RFI) currently in draft form, and the completed Corrective Measure Study (CMS) are expected to be made available for public comment as well. In addition to specific site activities, the IMWP presents an overview of proposed interim measures designed to mitigate contaminant source areas. These interim measures are somewhat comprehensive, and will require several years for full implementation. WQPD staff concurs that site activities for 2012 represent preliminary actions necessary to move forward with long-term site cleanup. These comments were prepared by separate staff members and compiled for submittal under a single cover, and some redundancy may be present.

EPA Response – EPA appreciates the thorough review and would like to provide clarification on several themes within these comments.

RCRA Public Participation – EPA is firmly committed to promoting broad and equitable public participation, and has conducted, and will continue to engage in significantly more public dialogue than described above. At a minimum, EPA and METG are following the public participation guidelines in the RCRA Public Participation Manual and the First Modification to the 1998 RCRA Consent Decree (under which the Interim Measure Work Plans (IMWPs) are

issued for formal public review and comment). Further, rather than limiting formal public participation in the IMWPs to comments on a single comprehensive interim measures work plan, EPA and METG have decided it is more inclusive to prepare and submit for formal public review and comment separate, individual, annual IMWPs for interim measures to be performed in each year beginning with 2012 during which the proposed interim measures will be performed. This way, the public will have an ongoing opportunity to provide input as new information comes in, and EPA and METG's vision of future interim measures, and potential final remedies continues to evolve and be refined.

Further, and perhaps more important, in addition to formal public review and comment, over the last two years EPA and METG have hosted or attended over 60 public participation meetings and provided presentations on the East Helena RCRA cleanup. Out of sixty two (62) stakeholder and public meetings, forty one (41)—or two thirds of all meetings—were specifically organized for and/or with officials and representatives of Lewis & Clark County. An additional fifteen (15) meetings—or one quarter of all such meetings—were open to the public, including the County. Additionally, approximately fifteen (15) technical documents have been posted on the METG website and/or provided directly to stakeholders for review and informal input, which is encouraged at any time. A copy of the Draft Phase II RCRA Facility Investigation was provided to the Lewis & Clark County Water Quality Protection District and EPA would make the draft document available to any additional interested stakeholders. Finally, with EPA approval, METG has contracted for additional public involvement support and will be providing stakeholder updates to entities identified at public meetings or through registration on the METG website.

EPA continues to welcome additional, specific suggestions for outreach to members of the public that we have missed or suggestions for mechanisms to effectively communicate the Site activities. EPA and METG are committed to continued transparent and open dialogue throughout the RCRA corrective action process.

Interim Measures under RCRA - Under the RCRA Corrective Action process, interim measures (IM's) are commonly used to achieve stabilization at facilities. IM's can be performed at any appropriate point in the RCRA process, and are often implemented before all remedy evaluations have been completed as part of the CMS[1]. The three proposed interim measures are not independent activities; rather, they are interrelated activities that require integrated and/or sequential implementation. Interim measures design and implementation will be phased and final decisions on each of the proposals will consider all new data and other information as generated by or made available to METG and EPA. As more fully described above, there will be opportunity for public comment on each of the subsequent years IMWPs.

[1] RCRA guidance specifically encourages implementation of IMs to control or abate contaminant releases at RCRA facilities. Furthermore, with respect to the East Helena Facility, Section VI.12 of the First Modification to the 1998 RCRA Consent Decree states that, "Interim measures, in addition to those which may already be in place, shall be used whenever possible and appropriate to achieve the goal of stabilization, which is defined to mean the control or abatement of imminent threats to human health and/or the environment (including, without limitation, actions in support of an interim measure), and prevention or minimization of the spread of hazardous waste or hazardous constituents while long-term corrective measure alternatives are being evaluated." Pursuant to its obligations under the First Mod, METG has proposed the IMs described in the 2012 IMWP while the CMS is being developed.

Timing for Interim Measures – The proposed schedule for the interim measures was established to meet the following objectives:

1. Stabilize conditions at the facility in a timely manner, such that future environmental impacts are minimized by:
    a. Continuing to reduce groundwater contact with contaminant sources, and contaminant releases to groundwater under the facility and slowing/controlling plume migration away from the facility to ensure that, among other things, public water supplies to the north are not further threatened (the primary goals of the SPHC interim measure).
    b. Removing the deteriorating, unmaintained diversion structure and smelter dam on Prickly Pear Creek (PPC), which are at risk of potential catastrophic failure during a high flow event if indefinitely left in place.
    c. Addressing the acres of degrading temporary liners installed by Asarco five years ago to prevent infiltration of precipitation through zones of contaminated subsurface soils (recognizing that such temporary liners have a maximum five-year life span and are already deteriorating beyond the point of repair).
    d. Widening the floodway and floodplain of the north section of PPC and moving the creek away from the slag pile will prevent erosion of slag into the creek, which may be contributing to downstream flood risk by aggrading the creek bed through the City of East Helena. The current overhanging and unstable slag also precludes safe public access to the northern section of PPC.
    e. Pursuant to the Montana Water Quality Act and the Montana Pollutant Discharge Elimination System (MPDES) Permit # MT0030147, Site stormwater is currently treated at the Site High Density Sludge (HDS) water treatment plant (WTP) in compliance with 2010 interim effluent discharge limits. Final effluent discharge standards, which will be effective August 1, 2015, will be significantly more stringent than the interim standards. The current HDS WTP cannot cost effectively meet these higher standards and, therefore, the ET Cover System interim measures are also required to eliminate the need to treat stormwater at the Facility.

2. Allow sufficient time to generate information needed to support sound and safe technical decisions. The 2012 IMWP presented a level of information sufficient to support conceptual approval of the three proposed interim measures. As noted in the 2012 IMWP, additional technical evaluations will be performed as part of the final design activities and implementation is being phased to allow adequate time to observe the performance of initial phases before implementing subsequent measures. Much of this data also is expected to be valuable as final remedial actions are evaluated in the CMS.

To achieve site stabilization efficiently and effectively, a phased approach to interim measure implementation was proposed by METG. Building on the interim measures previously implemented by Asarco (CAMUs 1 & 2; demolition and temporary capping; source removal & slurry wall construction), the interim measures proposed for 2012-2015/16 are designed to

address the above-referenced issues and the larger goal of reducing contaminant loading to groundwater in each of the subsequent IM phases to be performed in future years.

General Comments

1. The IM Work Plan 2012 describes three distinct corrective actions to be undertaken to reduce the migration of contaminants in groundwater. The three proposed interim measures South Plant Hydraulic Control (SPHC), Evapotranspiration Cover System (ET Cover), and Source Removal contains a complex series of actions that are interdependent and will transform the former ASARCO smelter site. Individually these actions appear to meet the definition of "interim measures" under RCRA, however when viewed as a whole, the actions described in this work plan appear to be the entire corrective action for the former smelter site. These actions preclude any other potential remediation efforts that could be taken at the site and would become the "de facto" final corrective measure for the smelter site cleanup. The WQPD finds this to be troubling since the next step under the RCRA process at the site will be the development of a Corrective Measures Study based on the findings of the RCRA Facility Investigation (RFI) that leads to a "Statement of Basis" for the selection of corrective measures with their design and implementation. The IM Work Plan and proposed schedule of implementation of these IMs over the next three year (2012 to 2015) short circuits that process of selection of the corrective measures. The site has had a RFI Phase II prepared since 2011 that is in fact the stated basis for much of the decision contained in the IM Work Plan, but that document has yet to be approved by EPA and released to the general public for review and comment. EPA itself has raised questions regarding the completeness of this document. The IM Work Plan – 2012 proposes a multitude of actions and decisions on cleanup of the site that have never been explained in an alternatives analysis and there are no costs reported in the document under review, precluding any cost/benefit analysis of these actions compared to other suggested remedial activities. Examples include the decision to demolish site buildings rather than redevelopment of the site, moving Prickly Pear Creek (PPC) away from the slag pile rather than re-contouring the slag pile in the vicinity of the creek, and so on. We are not suggesting that the decisions are not necessarily appropriate, it is just they have not been explained and the public has not been given an opportunity to be involved in those planning efforts as envision in a RCRA public process.

   EPA Response – Please refer to the responses above.

   The WQPD has advised EPA of its concern that the IM Work Plan and proposed schedule of implementation of these IMs over the next three years (2012 to 2015) "short circuits that process of selection of the corrective measures." As more fully described above, implementation of IMs to control or abate contaminant releases at RCRA facilities may be appropriate at any point in the RCRA corrective action process. METG has proposed the IMs described in the 2012 IMWP while the CMS is being developed. Based on the site-specific circumstances, as understood by EPA at this time, the proposed IM's are appropriate measures to be taken while final remedies are studied. If the interim measures successfully meet remedy performance criteria, they will be integrated into the final remedy for the facility. The interim measures are being phased and designed such that they will not preclude the implementation of other remedial actions if they are found not to be effective.

The EPA acknowledges the WQPD's concern that the Phase II RFI has not been finalized although EPA disagrees that the Phase II RFI cannot therefore be used to support interim measures, etc. The objectives of the Phase II RFI were to: define the current nature and extent of Facility-related contaminants in onsite soil, groundwater, surface water, sediment, and stormwater; identify source areas of the arsenic and selenium groundwater contaminant plumes; collect data to support the evaluation of the fate and transport of arsenic and selenium in the subsurface, and the current status and predicted future behavior of the groundwater plumes; collect data to better understand the geologic, hydrogeologic, hydrologic, and chemical characteristics of the Facility that control contaminant fate and transport in contaminated media; and, to provide information and data required for completion of the human health and ecological risk assessment portions of the Phase II RFI, and a RCRA CMS. The draft RFI has met these objectives. In addition, EPA does not expect the data and findings in final Phase II RFI Report to significantly differ from the draft. Thus utilization of the data and draft findings is both appropriate and reasonable to partly support the IM's. EPA and METG expect to finalize the Phase II RFI report in the near future. While the Phase II RFI is not required to go through a public comment and review period, and therefore no formal public comment process for the Phase II RFI is planned until a final Corrective Measures Study report is issued. WQPD has a copy of the draft (copies of the draft would have been made available to any member of the public requesting a copy) and could have provided informal input to EPA for consideration.

Regarding the WQPD's concern about redevelopment, METG evaluated the reuse potential of the existing structures on the Facility and determined that they could not be practically or economically refurbished for future use. EPA accepts this determination.

In response to the County's suggestion that the Slag Pile be re-contoured (in lieu of realigning PPC), EPA notes that the SPHC interim measure entails re-contouring the Slag Pile in order to stabilize the slag and minimize erosion into PPC.

EPA and METG will continue to hold stakeholder meetings every two months (EHECTIC), provide presentations to County officials (Board of Health, County Commissioners and WQPD Board), attend all East Helena City Council meetings and communicate with the public as described above.

2. The IM Work Plan – 2012 is predicated on the assumption that the SPHC actions will result in lowering the groundwater elevation in the plant area, reduce hydraulic gradients across the site, decrease groundwater flow velocities and decrease the contaminant mass flux leaving the site to the north in a downgradient direction. This result expected from the removal of Lower Lake, elimination of Upper Lake, lowering of Upper Lake Marsh and conversion of those areas to a palustrine emergent wetland and the relocation of PPC with the removal of the smelter dam is critical to the implementation of the other IMs. Capping the plant site without removal of contaminated hazardous materials if the water level is not reduced completely, will not result in cleaning up the source of groundwater contamination. The reduction of groundwater levels projected by the Preliminary Evaluation South Plant

Hydraulic Control (GSI, 2011) predicted a significant greater groundwater drawdown then was demonstrated during the limited testing reported in the IM Work Plan – 2012 conducted from October 2011 through February 2012. This is a prime example of the insufficient data utilized throughout this plan in justification of the proposed interim measures. The Preliminary Evaluation report used one year of surface water flow measurements and limited groundwater levels to provide an analysis with a stated level of significant uncertainty. The METG has attempted to fill that lack of data from its testing but again that lacks the time and seasonal variability to be confident in predicting that the measures will actually achieve the desire result.

EPA Response - The above referenced section specifically discusses the preliminary evaluation of SPHC IM effectiveness. This evaluation was completed in July 2011 using the historical data record, which METG, EPA and GSI knew was incomplete. Subsequent to the preliminary GSI analysis, the Upper Lake Drawdown Test was designed and initiated in the fall of 2011 to collect adequate data for a more robust and complete analysis. In combination with the 2011 and 2012 FSAPs, the Upper Lake Drawdown Test was designed to document and quantify the hydrogeologic response of site groundwater levels and flow rates to reduced Upper and Lower Lake recharge to Site groundwater. Additionally the Upper Lake Drawdown Test is intended to provide additional information on the overall Site hydrogeologic system in order to: quantify the Site groundwater system response to lowering of the Upper and Lower Lake water levels—a significant component of the SPHC IM; identify potential preferential groundwater flow paths through the former Smelter based on the magnitude and timing of groundwater level responses in individual wells; and refine aquifer hydraulic conductivity estimates based on the groundwater level response to dewatering in various portions of the site. The test is ongoing. The hourly, daily, weekly and monthly data collected from the Upper Lake Drawdown Test is supplemented by over 25-years of bi-annual water levels and a variety of seasonal water level/water quality data as detailed in the 2011 Field Sampling and Analysis Plan (FSAP) and the 2012 FSAP. These robust datasets include a variety of seasonal information. The results of the Upper Lake Drawdown Test and FSAPs clearly demonstrate the expected benefit from SPHC interim measure. Updated analysis from these data collection programs will be included in the draft 2013 Interim Measure Work Plan and factored into all detailed design activities.

3. Of particular concern is the lack of evaluation of the water levels response to the varied levels of spring runoff of PPC and periodic flooding. If the groundwater elevations are periodic increased this would negate the justification for the SPHC if the contaminated materials left on site are re-saturated and contaminates are remobilized during these times. The low permeability fill barrier to be constructed north of the former location of Lower Lake is intended to try to address this possibility. But to be effective the fill barrier would need to be keyed into the Tuff layer which may or may not be found at this location, be physically continuous in its lateral extent, and at a depth that would allow the fill barrier to constructed most likely in saturated conditions. Again a great deal of uncertainty and risk.

EPA Response – See response to #2 above. Existing surface and groundwater data is more than adequate to quantify the relationship between high flows in Prickly Pear Creek (PPC) and impacts to groundwater elevation, particularly by monitoring the 50-year flood event of PPC last year. Furthermore, EPA and METG fully expect periodic high flow events to re-saturate and re-mobilize contaminants in groundwater, because these events are inevitable. Even with the likely mobilization of contaminants to groundwater that occur after those high flow events, the benefits of lowering groundwater to reduce the ability to mobilize contaminants in groundwater are self-evident and documented in the preliminary results of the Upper Lake Drawdown Test.

4. To proceed with the project without the data to provide some assurance of success of the final outcome is unsupportable particularly when the other measures undertaken are dependent on that outcome of the hydraulic controls. One can say that the use of adaptive management is appropriate here, however, these measures are so expensive, interconnected, and scheduled to be implemented is such a short time frame that there will be no opportunity for adaptive changes once the Source Removal actions are competed and the ET Cover has been placed with the potential of a CAMU holding hundreds of thousands of cubic yards of hazardous wastes permanently located on the smelter site.

   EPA Response – In additional to the responses above, EPA offers the following comments in response to the WQPD's concerns about the assurance of success, schedule and magnitude of the proposed interim measures:

   a. The expected benefits of SPHC IM support initial earlier projections. It also is clear that the SPHC IM, if successful, will be significantly more cost effective than excavation and disposal of all sources of contaminant loading to groundwater, extraction and treatment of groundwater contamination and/or other "traditional" groundwater remedies;
   b. In addition to being a sound remedial option on its own merit, the Source Removal IM is an appropriate approach to address METG's obligations set forth in the First Modification to the 1998 Consent Decree, which mandates completion of Asarco's unfinished obligations under Process Pond Consent Decree, including removal of contaminant sources to groundwater from the Tito Park and Lower Lake areas. EPA understands that there are a number of arguments relating to the best site for building a CAMU, but it is clear that building a CAMU at the facility is the only cost effective solution for long-term disposal of the high volume of wastes that must be addressed. EPA also notes that the two existing CAMUs were designed and constructed as part of the interim measures implemented by Asarco at the facility.
   c. The ET Cover System interim measure is required, in part, to cost effectively and timely address existing, deteriorating temporary covers installed by Asarco. Additionally, an ET Cover System represents the most viable mechanism for preventing infiltration of precipitation, which is also a source of contaminant loading to groundwater and, as previously noted, must now be treated at the HDS WTP which cannot be cost effectively modified to meet final MDPES numeric discharge limits which will become effective on August 1, 2015.

d. These three proposed interim measures will all work together to increase the overall benefit to the environment. The data collection and analysis that has been, and continues to be generated demonstrate that the combination of these interim measures will successfully and substantially reduce the amount of contamination migrating offsite via groundwater. As part of final design, specific performance metrics will be developed and proposed for EPA approval to assess the degree to which these measures are successful. Additional technical details on specific elements of the proposed interim measures will be presented in future IMWPs.
e. The timeline for implementation of the interim measures spans a period of at least four years. EPA believes that such a timeframe is both reasonable and protective of public health and the environment.

5. The timeline of the implementation of the proposed Interim Measures in the IM Work Plan – 2012 is excessively fast to the point of being hasty lacking the appropriate time to carefully plan, consider specifics of design and alternative opinions and ideas, and the short design period drives up the costs by pushing engineering consulting services beyond normal time frames for designing these types of projects (i.e. siting and design of a CAMU, wetland removal and restoration, stream relocation design and implementation and a large scale ET cover, etc.). It also eliminates any meaningful public input and review.

   EPA Response - See EPA's general responses and specific responses to #1, #2, #4 and #5 above, which describe the factors governing the schedule for implementation of the proposed interim measures and the extent of public participation and involvement in the process. Regarding design of the realigned creek, the schedule calls for a more than one year for development and review of the proposed design. EPA believes that the schedule provides for public and stakeholder review and comment.

6. Some specific actions if one accepts the decision to cap the plant site based on the plan are appropriate and acceptable. The plan for an ET Cover is a valid technology for capping the plant site materials. The WQPD would hope that the specifics of the design of the ET cover would be available for review and input prior to final design and implementation. The conceptual design found on page 2-11 of the IM Work Plan – 2012 is acceptable if the ET Layer is 24 to 32 inches as a conservative approach to this permanent feature. The ET Cover of a CAMU would also be acceptable with a conservative approach by adding a protective membrane at the base such as a geosynthetic clay liner.

   EPA Response – Same response as Health Department #11. EPA appreciates the acknowledgement of the appropriateness of the ET Cover System. EPA, METG, MDEQ, and MDOJ, have held detailed discussions and technical reviews of the design criteria for the ET Cover System. EPA will review and approve the design documents for the ET Cover System. Since the work is scheduled for 2014, the design details will be included in the draft 2014 Interim Measure Work Plan, which will be subject to a thirty-day public review and comment process.

7. We cannot support the proposed change of the specified location of the third CAMU from the Tertiary bench west of the plant site as originally proposed by ASARCO and approved by EPA as the most groundwater protective location because of its low permeable soils and geology. Placing the permanent repository of hazardous materials excavated from Tito Park, under Lower Lake, and other onsite removals in the alluvial historic floodplain of PPC is an unacceptable risk for an economic reason. This repository must contain the toxic material into perpetuity and the first priority should be placement in the most secure location utilizing the natural conditions to aid that protection of human health and the environment. Placement in the LOSA would require all the protection to the underlying groundwater be based on engineered design features which cannot be guaranteed to not to fail and indeed are likely to fail sometime in the future.

   EPA Response – The existing CAMUs were sited at their current locations in large part because the Smelter was an operating facility. As explained below, the decision to site the third CAMU in the LOSA was based on an analysis of the stratigraphy and hydrogeological conditions.

   The stratigraphy of the LOSA is not fully of comprised alluvial material but includes a high proportion of tertiary age materials at depth. The western portion of the LOSA is underlain by tertiary sediments, including the altered ash/clay low permeability unit. This stratigraphy is documented at well pair DH-61/62 in the east-central LOSA area. The ash/clay layer was encountered at 30 feet in these borings, with DH-61 screened from 20 to 30 feet below ground surface. Since DH-61 was installed and completed in May 2001, groundwater has never been present in DH-61even throughout the very wet 2011 spring season. DH-62 is completed at a depth of 65 to 75 feet at the same location with static water levels ranging from 40 to 45 feet, or 10 to 15 feet below the top of the ash/clay. This information shows that the tertiary sediments above the lower permeability ash/clay unit are unsaturated in this area. Decreases in groundwater levels resulting from the South Plant Hydraulic Control project are expected to dewater additional portions of the LOSA, including the area around monitoring well DH-71. Depths to groundwater beneath the remainder (eastern) portion of the proposed CAMU area are approximately 30 to 40 feet, offering considerable attenuation potential and protection against impacts to underlying groundwater. The physical attributes and conditions of the LOSA, as well as details of the proposed CAMU design and the ability to selectively place materials in various portions of the CAMU, make the LOSA an ideal location for the CAMU. Additionally, because the LOSA must otherwise receive the ET Cover, locating the CAMU in that area will significantly reduce the costs for long-term management, monitoring and maintenance of the third CAMU that would be required if it were sited on the tertiary bench, as proposed by the County. The full analysis of the CAMU siting criteria will be included in the draft 2013 IMWP.

8. The relocation of Prickly Pear Creek to the east onto the Tertiary bench is a major undertaking of its own right. Again the timeline is insufficient to take the time to properly generate a design with consideration of the issues identified in the IM Work Plan – 2012, but also planning for future uses, community values, sediment control with removal of the dam, appropriate reference reaches to mimic a natural stream channel to deal with the large

gradient change in the areas before the railroad bridge, and potential economic opportunities (i.e. kayak park, and other recreational options). This action necessitates a public involved planning process and appropriate outside professional review than is projected by the timeline proposed in this work plan.

EPA Response – See response to Health Department #3. The schedule, sequence and durations for final design of each interim measure element take into consideration the time needed to generate the necessary information to meet project objectives. The design for the realigned PPC will begin later this year and will be developed throughout 2013. Construction is scheduled for 2014 or later. EPA notes that one of the objectives of the extensive permitting process required for the PPC work is to ensure that appropriate professional review and expertise. Opportunities for public comment have been incorporated into the process. The PPC realignment design team is expected to include experts in stream design from both the public and private sectors, including the fluvial geomorphologist retained in the past by the County to evaluate PPC. Therefore, funding an additional, outside professional to review the design is not required or justifiable. Regarding economic development opportunities, METG is currently working on the third phase of its redevelopment planning studies and, contingent on the final results, will evaluate opportunities to integrate potential redevelopment into the cleanup plans as is allowed under the Settlement Agreement. However, the Custodial Trust lacks the funding and authority to redevelop the site and therefore, such activities will have to be performed by third party purchasers and/or other stakeholders and beneficiaries.

9. The WQPD does not object to the 2012 objectives of the Work Plan of construction of a prefabricated bridge structure over Smelter Dam and the relocation or abandonment of utilities located on the east tertiary bench. Demolition of building and infrastructure in the Lower Ore Storage (LOSA) would be appropriate if there was a clear justification for not proceeding with redevelopment of the plant site. We also can accept the future needs to excavate wastes from Tito Park, Lower Lake and the eventual removal of Smelter Dam, but the EPA and METG must do more to provide public input in a timely and meaningful process with justifications for the alternatives that were dismissed.

   EPA Response – EPA appreciates your support of the 2012 IMWP objectives for construction of a prefabricated bridge structure over Smelter Dam and the relocation or abandonment of utilities located on the east tertiary bench. METG has completed the first two phases (opportunity and constraints analysis and market analysis) of the redevelopment analysis and will complete the final phase (concept planning) within the next several months. The results of the redevelopment studies indicate that environmental constraints, stigma and absence of market interest and/or incentives hinder potential redevelopment of most of the former smelter property for new industrial and/or commercial uses. METG has concluded, and EPA agrees, that reuse of these areas should be limited to passive recreational uses that are compatible with the ET Cover System. EPA and METG are therefore planning to proceed with Site demolition activities.

10. The IMWP provides a comprehensive conceptual overview of proposed interim measures, or remedial actions, to be implemented at the site. Use of the term interim infers that these actions may or may not be part of the final remedy for the site, and that the subsequent assessment of remedial alternatives for the site may result in separate remedial actions. However, the interim measure remedial actions all require significant engineering design and long-term planning for implementation. The scale of these actions will result in them being incorporated into the final remedial actions for the site, to be determined with the release of a draft CMS, public comment, and then a final CMS which addresses public comments. The selection of final remedial actions requires meaningful public participation consistent with RCRA guidelines. The current approach for implementation of interim measures circumvents the public process required for the selection and implementation of appropriate remedial actions for the facility.

    The proposed interim measure remedial actions should be based on the technical assessment of the nature and extent of contamination at the site as presented in the Phase II RFI. Unfortunately, the Phase II RFI has not been finalized, nor has it been submitted for public review and comment. The final Phase II RFI should present a comprehensive understanding of the site, including identification of the physical processes associated with migration of contaminants away from the site as exposure pathways to both human and environmental receptors.

    EPA Response – Please see EPA's general comments and specific responses to #1, #2, #4, #5, # 6 #7, and #8. The interim measures are based on data collection and analysis as detailed in numerous documents available to the public in addition to the draft Phase II RFI, which had limited goals and objectives (see Section 1.3, Phase II RFI May 2010).

11. Recent public presentations have noted that the RCRA site process reflects meaningful public involvement with consideration of the concerns of all stakeholders. The interim measures proposed for the site are comprehensive, costly, and will be part of the final remedial actions implemented for the site. Since they will be part of the final solutions, the implementation of them should be included in the site Corrective Measures Study (CMS). Reviewing the cost-benefit relationship for these actions, compared to other potential alternatives, will help ensure that they represent the best remedial alternatives for long-term site restoration. Incorporation of them into the CMS will also allow for public comment on the proposed actions as meaningful involvement of stakeholders.

    EPA Response - See all responses to timing and public participation above. The effectiveness of the interim measures for 2012 – 2015 and interim measures previously implemented by ASARCO will be evaluated in the CMS.

12. The IMWP represents the first document where public comments may be submitted on the work activities conducted for the site. As such, the document should be considered "stand-alone" and provide sufficient information for the public, or technical representatives of the public, to complete a technical review of the proposed activities. From this perspective, the IMWP is incomplete since it refers to information in the Phase II RFI, which has not been

finalized, and references a number of site documents that have been completed. Unfortunately, the majority of these documents, including the Phase II RFI, have not been made available to the public. As a result, comprehensive technical reviews of proposed actions are limited at this time. Further, the IMWP presents only limited amounts of actual data, and relies on "conceptual models" for understanding of the proposed actions. The need for these actions should be presented with actual data to support the need for activities. Also, any technical document referenced as providing baseline information on the site should be made available for public review.

EPA Response - See general responses to timing and public participation above.

13. Interim measure actions under RCRA are generally needed to mitigate existing high risk levels from contamination by eliminating exposure pathways and/or by stabilizing conditions in unstable source areas. These interim measures will not have any immediate results for either of these factors. While the proposed activities for 2012 are necessary for long-term remediation of the site, the necessity for the follow-up actions in subsequent years should be considered in the CMS.

    EPA Response - See general response to timing.

14. The south plant hydraulic control (SPHC) interim measure reflects a conceptual model where the majority of ground water flowing through the site is derived by loss from Lower and Upper Lake(s). Unfortunately, the long-term water level database has only semi-annual data. As a result, there is little baseline data available to characterize how hydrologic conditions would be expected to fluctuate seasonally. Wells monitored quarterly in East Helena by WQPD staff from 1990 until 2005 show potential seasonal fluctuations of twenty feet or more (GWIC IDs 892188, 892177). The magnitude of the seasonal fluctuation of water levels at the site is unknown at this time, and should be determined for proper evaluation of the effects of the SPHC system. The current assessment, prepared by GSI and not made available to the public, provides only a qualitative review of conditions.

    While efforts have been made to obtain more frequent data during the last year, the collected data reflects recharge and regional conditions of a very high water year from a large snowpack during the 2010-2011 winter, and spring/early summer precipitation. Water levels have been observed at near historic high levels in both bedrock and alluvial wells around the Helena Valley. As a result, the ground water level database used to characterize conditions for the SPHC are not representative of general conditions in the area observed over the past decades. Design criterion for the SPHC needs to reflect actual data characterizing the hydrologic system so that the potential drawdown effects can be better predicted.

    EPA Response - See general responses to public participation above. The magnitude of the seasonal fluctuation of water levels at the Site has been quantified with supplemental data collected since winter 2011 (see 2011 and 2012 FSAPs). These data sets (hourly, daily, weekly and monthly water levels) have been used to evaluate of the effectiveness of the

proposed SPHC IM. METG continues to collect seasonal water level and water quality data at the site.

15. The current site hydrogeologic conceptual model identifies Prickly Pear Creek as the only source of ground water to the system. While this makes the modeling process easier, the resulting model may not be representative of actual conditions. For the Seaver Park area, ground water temperature, major ion water quality and water isotope data suggest that recharge occurs from the underlying bedrock system. This water source provides sufficient recharge for wells utilized by residents in this area, confirming that bedrock recharge is significant. This is consistent with conclusions derived from the regional water balance for the area from the USGS Report on the Hydrogeology of the Helena Valley (Briar & Madison, 1992). Since subsurface recharge to the alluvial aquifer system represents a significant component of recharge, especially during winters months when surface flows limit recharge, bedrock flow should be considered in the conceptual model, and the numeric ground water flow model.

    For the SPHC and the area upgradient (south) of the upper/lower Lakes and major sources of ground water contamination, there is no data characterizing upgradient hydrologic conditions. Is there a component of bedrock recharge upwelling into the stream system? This type of recharge may limit the effectiveness of the SPHC system. Additionally, as evidence by the extremely high permeabilities of sediments on the site, there is a potential for the Prickly Pear Creek valley to have high permeability alluvial materials filling the valley upgradient of the site – beneath the lakes and further upgradient. There is no data addressing this. Such an alluvial aquifer, in communication with the stream further upgradient, would still transmit water through the system independent of the change in conditions induced by draining the lakes. This represents another background condition that should be clarified, with data, to fully understand the potential impacts of the SPHC to the site.

    EPA Response - The current conceptual hydrogeologic model for the Site identifies Prickly Pear Creek, upward vertical gradients and the west Tertiary volcanicastic sedimentary unit sediments as the three major sources of ground water to the Site system. The geometry of the alluvial system upgradient of the Site and underlying PPC has been quantified and appears to be a minor flow component to the system of the Site.

16. Water table maps for the site generally show local water conditions from a single aquifer. The maps should depict the limits of the high conductivity alluvial aquifer which is present in the site, with boundaries against other geologic units (see Stickney, 1987). The Tertiary volcanicastic sedimentary unit to the west has significantly different hydrologic properties, with ground water flow as recharge to the alluvial system. Data characterizing both geology and hydrologic conditions on the east bench has not been made available to WQPD staff. Regardless, the hydrogeologic assessment should delineate and characterize the different aquifer systems present for the site.

    EPA Response - Comment noted. In general the Tertiary volcanicastic sedimentary unit to the west of the Site does discharge to the alluvial system. Current Site data suggests that

contaminated groundwater in Tito Park recharges the Tertiary volcanicastic sedimentary area in the vicinity of CAMUs #1 and #2 indicating that in this specific area these two distinct geologic units are hydraulically connected and the flow directions are inverted from the general model. Data characterizing the east Tertiary bench stratigraphy and hydrologic conditions are available for review.

17. The disposition of the volcanic tuff as a discrete unit should be confirmed. The volcaniclastic sediments west of the site were observed during drilling as thick, continuous sequences of a lapilli-tuff type ash layer. This type of deposit occurs proximal to volcanic sources with relatively rapid deposition of the ash layers. The geotechnical borings for the US12 overpass indicate that this unit, as a volcanic ash, has a thickness of 100 feet or more. These deposits represent a series of intense volcanic eruptions, with sediment layers potentially present separating thick ash sequences from each event. The sedimentary layers may then transmit water. The disposition of the single "ash" layer at the site should be verified since it is integral to the site hydrogeologic conceptual model.

    The ash layer downgradient from the site is actually a clay-rich sedimentary unit, with clasts of the ash within it. While similar, this is not the same unit and there is no reason to expect it to be continuous with the ash observed onsite.

    EPA Response - Comment is noted and will be forwarded to METG to be incorporated into the Site stratigraphic model.

18. A regional background level for Arsenic is indicated on Figure 3-8 and 3-9 as 17 ug/L. There is no indication for how this concentration was determined. WQPD well data would not support this conclusion. The background level for this type of site should be determined based on site-specific upgradient conditions.

    EPA Response – Same response as response to Montana #3. References to background concentrations have been eliminated from the 2012 IMWP.

19. Figure 2-8 indicates the expected potentiometric surface after initiation of the SPHC. The methods used to complete this figure are not explained. The use of the figure is misleading, since there is no way to predict the impacts of SPHC without using a properly calibrated numerical model which accounts for all components of the hydrologic system.

    EPA Response - The methods used to develop this figure were not based on modeling but on actual 2011 and 2012 water level data collected during the Upper Lake Drawdown Test. A technical memorandum summarizing the first year of results of the Upper Lake Drawdown Test will be made available with the 2013 IMWP.

20. The discussions regarding the source excavation do not indicate the water level, or that dewatering of the system will likely be needed to access deeper soils. The dewatering method should be indicated, with methods to manage the contaminated water.

EPA Response – The two excavation activities currently planned for the Source Removal IM were originally identified for implementation in the Process Ponds Operable Unit (OU1) CERCLA Record of Decision. One of the purposes of the Prickly Pear Creek temporary bypass is to lower groundwater prior to excavation in order to reduce dewatering volumes. The feasibility and value of performing additional source removal actions will be evaluated as part of the interim measures and CMS work. Additional technical information regarding potential source removal actions will be provided in future IM Work Plans and specific details will be developed during final design.

Closing

Any further review of the proposed interim measures is not possible without the availability of specific designs and the specifications of the materials to be used in those actions not presented in IM Work Plan - 2012. Please contact me if you would like to discuss any of the comments, especially related to the technical issues. WQPD staff, as previously indicated, would be happy to assist with the technical components of the assessment of site and downgradient ground water conditions.

EPA Response –Additional design information will be included in future IMWPs to be provided for each year when the IMs are to be implemented at the facility.

Sincerely,

James Swierc
Hydrogeologist
Lewis & Clark County
Water Quality Protection District

CC: Cindy Brooks, METG
Lewis & Clark Commissioners
Melanie Reynolds, L&C Co. Health Officer
City of East Helena Mayor & City council

8/27/2012 - EPA RESPONSE TO JAMES SCHELL COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – CONCEPTUAL OVERVIEW OF THE PROPOSED INTERIM MEASURES AND DETAILS OF 2012 ACTIVITIES,* SUBMITTED ON 7/16/2012.

Date: July 16, 2012

Subject: Public Comments - EH Draft 2012 IM Work Plan

To: Betsy Burns
EPA Region 8 Montana Office
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Suite 3200
Helena MT 59624
burns.betsy@epa.gov

From: James Schell
Box 1610
East Helena MT 59635-1610
jamie@schell.net

Thank you for the opportunity to comment on the well written and very comprehensive East Helena Draft 2012 Interim Measures Work Plan.

These comments were produced using the *Final Draft Former ASARCO East Helena Facility Interim Measures Work Plan -Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities* document dated June 2012. (source)

The following comments are my own and may not represent the opinions or comments of the City of East Helena or the East Helena City Council.

Residents of East Helena, myself included, are naturally concerned about the extensive amount of upstream work that the Montana Environmental Trust Group is doing to and along Prickly Pear Creek (PPC). Understandably, being downstream, these concerns include future increased sand/sediment movement, groundwater level changes, flood impacts, and contaminant migration.

General Comments

Comment #1
Included in the SPHC IM section 2.1.3 (Benefits) on page 2.2, dot point two, is the statement: "Decreased Sediment Load to PPC". I believe this statement to be misleading and could be misconstrued. While it is true that the planned measures will decrease slag sediment transport downstream, nothing presented in the Draft IM that I noticed discusses the possible increase of other sediment transport or nutrient fluxes due to the removal and non-loading of the Smelter dam. In my opinion, the statement should include the word "slag".

EPA Response – EPA agrees. METG, please replace the word “sediment” with “slag” in Section 2.1.3.

Comment #2
Included in the SPHC IM section 2.1.4.2 (Additional Evaluation of Groundwater Potentiometric Surface) on page 2-3, in the second paragraph, are the statements: "As can be seen, an overall drop in groundwater elevations is expected[.]" and "Reduction in groundwater level decreases with increasing distance from the South Plant area."

While Figure 2-7 and Figure 2-8 outline dated and estimated potentiometric mapping for November, I believe a statement and/or data regarding analysis of high water months should also be included.

Inclusion of a statement and potentially additional months' data, for example high water months, would give the reader confidence that year-round on and off-site groundwater levels will be reduced (or not reduced) where expected.

Additionally, I believe that quantifying the distance of the reduced groundwater levels from the site would give readers a better understanding of where the reduction in levels can be expected to cease.

EPA Response – EPA agrees. Data has been and continues to be collected throughout the duration of the Upper Lake Drawdown Test. Data and analysis through June of 2012 has been included in the final 2012 IMWP (see Technical Memorandum, Appendix A of the 2012 IMWP). Additionally, data from the Upper Lake Drawdown Test is being incorporated into the Numeric Groundwater Flow and Contaminant Transport Models and will further inform the success of the SPHC IM. The Upper Lake Drawdown Test will continue to be implemented, analyzed, and updated for use in future IMWPs.

Comment #3
Section 2.1.4.4 (Groundwater Flow and Contaminant Transport Modeling) on page 2-4 contains a paragraph explaining the upcoming completion of initial flow models, calibration, scope, and schedule regarding groundwater and contaminant transport.
In my opinion, the East Helena Final 2012 Interim Measures Work Plan, scheduled for release later this year, should include mention of an estimate of the amount of water being diverted from the site that will flow downstream. With the additional water flowing downstream that is not recharging the site's aquifers, quantification would give the reader confidence that these interim measures will not potentially effect ground and surface water negatively downstream if this is indeed the case.

EPA Response – EPA agrees. The evaluations described above will be included in the final design for the PPC realignment and will be referenced in the appropriate IMWPs.

Comment #4
Dot point nine in section 4.1 (Summary of Existing Data) on page 4-1 states: "Sediment chemistry – Completed. Data are summarized in the draft Phase II RFI Report. Limited additional data may be needed in Lower Lake and PPC upstream and downstream of Smelter Dam to support detailed engineering evaluation. These data needs are currently being evaluated."

Additionally, the second dot point in section 4.2 (Additional Data Required for 2012 Work) on page 4-2 only addresses upstream data: "Sediment chemistry upstream of Smelter Dam".

In my opinion, current sediment toxicity measurements upstream and downstream should be obtained to supplement the Phase II RFI Report data. If no additional downstream and/or upstream sediment chemistry measurements are obtained, inclusion of the reasons why these data were omitted should be addressed.

EPA Response – EPA partially agrees. Contaminant concentrations in sediment have been quantified and reported as part of the draft Phase II RFI and the final report for the East Helena Baseline Ecological Risk Assessment (BERA) (December 2012). Additional sediment quality data may need to be collected from Lower Lake and PPC upstream and downstream of Smelter Dam to determine the appropriate disposition of excavated sediments (in the CAMU or under the ET Cover).

Comment #5
Appendix A outlines the ongoing Upper Lake Drawdown Test and states that the drawdown test results and interpretation release is scheduled for 2012 in a detailed technical memorandum.

I believe that these test results and interpretation, including all collected data such as PPC flow measurements and turbidity studies, should be included in the East Helena Final 2012 Interim Measures Work Plan, perhaps as an Appendix. Including this information in the Final 2012 IM, as opposed to a separate document, would help readers better understand the measures and the motives behind them.

EPA Response – EPA partially agrees. Please see EPA's response to Comment #2.

Additional/Minor Comments

Comment #6
Dot point three on page 2-5 of section 2.1.4.6 (Natural Resources) lists the *Existing Conditions Stream Assessment, Prickly Pear Creek, East Helena Smelter RCRA Site*
document date as December 2, 2011. Copies of Final Report of this document were distributed to the City of East Helena and are dated January 27, 2012, not December 2, 2011. See also section 2.1.5.2 (first dot point) as well as section 4.1 (sixth dot point).

EPA Response – EPA agrees. METG, please correct the date for the Final Interim Measure Work Plan.

Comment #7
The second sentence in the fourth paragraph on page 3-4 of section 3.1.5 (Nature and Extent of Soil Contamination) contains the wording ".... and other areas of East Helena proper performed under CERCLA." I believe the word "proper" should be replaced with "properly".

EPA Response – EPA disagrees. The wording was intended to define location within East Helena. METG, please delete the word "proper" to clarify the sentence.

Comment #8
The sentence just preceding the two final dots points on page 6-2 of section 6.1 (Application of Area of Contamination Policy and CAMU Rule) contains the wording ".... and eventually the new CAMU 3 will be used do the following:". I believe the word "to" should precede the word "do" in this sentence.

EPA Response – EPA agrees. METG, please correct for the Final Interim Measure Work Plan.

Comment #9
The sentence just after Table 2-2 on the third text page of Appendix A contains the date "October 31, 2001". I believe this date should be "October 31, 2011".

EPA Response - EPA agrees. METG, please correct for the Final Interim Measure Work Plan.

Comment #10
The second sentence in the final paragraph on the third text page of Appendix A contains the date "2/21/11". I believe this date should be "2/24/11" to match the two accounts of this date on the previous page and Figure 4 of the same appendix.

EPA Response – EPA assumes that you are referencing the data 2/24/12. METG, for consistency please ensure that the date is changed from "2/21/12" to "2/24/12" in the Final Interim Measure Work Plan.

Thank you very much for your attention to these comments and please let me know if you have any questions.

8/27/2012 - EPA RESPONSE TO LEWIS AND CLARK COUNTY HEALTH DEPARTMENT COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – CONCEPTUAL OVERVIEW OF THE PROPOSED INTERIM MEASURES AND DETAILS OF 2012 ACTIVITIES*, SUBMITTED ON 7/16/2012.

July 13, 2012

Betsy Burns
EPA Region 8 Montana Office
10 W 15th Street, Suite 3200
Helena, MT 59626

RE: Comments on 2012 Interim Measures Work Plan

Dear Ms. Burns:

Thank you for the opportunity to provide comments on the Former ASARCO East Helena Facility Interim Measures Work Plan – Conceptual Overview of the Proposed Interim Measures and Details of 2012 Activities (Work Plan, June 2012, Montana Environmental Trust Group, LLC (METG). The projected work is ambitious and many elements of the work plan seem reasonable, but data upon which these plans are based seems uncertain, with several notable gaps. Key concerns of the Environmental Division of the City-County Health Department include modification of the Prickly Pear Stream channel, disposition of soils excavated from the stream channel and bypass work areas, long-term management of sediment, and the completeness and reliability of data upon which Interim Measures are based. There is a sense that the timeline seems rushed and more aggressive than the site demands, considering the data gaps that are noted and the questions that remain on many aspects of the project. More detailed comments follow.

1. The Data used in the Work Plan is based in part on the draft Phase II RCRA Facility Investigation Report (RFI), GSI Water Solutions, Inc., 2011. The vast amount of data in the RFI and its organization makes it difficult, if not impossible, for the County or the public to understand what data were used for the development of the Work Plan. It is also difficult to identify whether adequate data has been collected to support the decisions made in the Work Plan. The information in the RFI has not been publically presented or explained.

   EPA Response – The purpose of the Phase II RFI was to address Facility characterization issues not addressed in previous investigations. The Phase II RFI was also designed to summarize existing data about the nature and extent of contamination at the time that the Phase II RFI draft report was prepared. The Phase II RFI covers a vast amount of data; however, it was not the sole source of information used in preparing the 2012 Interim Measures Work Plan (IMWP).

   In addition to the Phase II RFI, the following documents and resources were used to develop the 2012 IMWP:

(1) Independent Review of the Groundwater Conceptual Model (GSI, January 2011)
(2) 2011 Field Sampling and Analysis Plan (FSAP) (METG, March 2011),
(3) 2012 FSAP (METG, April 2012),
(4) Existing Conditions Stream Assessment (METG, January, 2012),
(5) Wetland Delineation Data Summary Report (METG, January, 2012),
(6) East Entrance Dam – Engineers Inspection Report (METG, March 2012)
(7) **Groundwater Flow and Fate and Transport Model Work Plan East Helena Site (METG, March 2012)**
(8) Baseline Ecological Risk Assessment (METG, December 2011)
(9) Preliminary results from the Upper Lake Drawdown Test.

All of the above-referenced documents as well as the draft Phase II RFI report have been provided to Lewis & Clark City-County Health Department (County) and information from these sources has been presented and reviewed by EPA and METG in a number of public forums.

The EPA acknowledges the County's concern that the Phase II RFI has not been finalized. However, EPA maintains that it is nevertheless appropriate to incorporate the data and findings from draft Phase II RFI report into the 2012 IMWP because, as explained below, a final Phase II RFI report would not alter the IMWP.

The Phase II RFI work plan was prepared by ASARCO in 2009. In 2010, based on comments from EPA, the Montana Environmental Trust Group (METG) modified the Phase II RFI work plan and collected the majority of field data. The draft Phase II RFI report was prepared by METG in 2011.

The objectives of the Phase II RFI were to: define the current nature and extent of Facility-related contaminants in onsite soil, groundwater, surface water, sediment, and stormwater; identify source areas of the arsenic and selenium groundwater contaminant plumes; collect data to support the evaluation of the fate and transport of arsenic and selenium in the subsurface, and the current status and predicted future behavior of the groundwater plumes; collect data to better understand the geologic, hydrogeologic, hydrologic, and chemical characteristics of the Facility that control contaminant fate and transport in contaminated media; and, to provide information and data required for completion of the human health and ecological risk assessment portions of the Phase II RFI, and a RCRA CMS. The Phase II RFI work has met these goals; and since EPA does not expect the draft report to undergo substantive modification before being finalized, utilization of the Phase II RFI findings prior to finalizing the draft, along with all of the other data and information in the documents listed above is both appropriate and reasonable.

EPA has requested that METG prepare an Executive Summary for the final Phase II RFI report that qualitatively summarizes the results of the Phase II investigations. EPA and METG expect to finalize the Phase II RFI report, including the executive summary, in the near future.

2. The Work Plan itself identifies the data being used as uncertain, qualitative and even lacking. Section 2.1.4.1, Page 2-3, paragraph 1 states that GSI conducted a "…qualitative evaluation to provide insights on the extent to which SPHC IMs might reduce groundwater levels and hydraulic gradients within the former Smelter site, and to identify the types of information and analysis necessary to evaluate the potential more rigorously". Further reading in this section indicates that GSI thought that SPHC IMs would likely lower groundwater levels, but that there were uncertainties including a "… lack of geologic and groundwater data farther to the east of the former Smelter site, making it difficult to predict if seepage from a realigned creek…," might migrate back toward the Smelter site. Since the Smelter site is also the general location of the CAMU unit being proposed, and the site is also the location of the slag pile, both of which are probable sources of contamination to groundwater, it seems reasonable that prior to taking any major engineering steps which result in unpredictable outcomes, more groundwater level data should be collected: specifically, one full year including high water season which is typically from April through October in this area. Without such information, the successful outcomes of the projects identified in the Work Plan are questionable.

   EPA Response –The 2012 IMWP makes it clear in a number of places that the information provided was a summary of initial evaluations, but that additional evaluations are ongoing to develop sufficient information to make appropriate technical decisions. Results of these additional studies have been presented in a variety of stakeholder forums. All additional data collection and analysis efforts will be presented in the appropriate future IMWPs.

   The above referenced section specifically discusses the preliminary evaluation of the potential effectiveness of the soon-to-be-proposed South Plant Hydraulic Control (SPHC) interim measure. This evaluation was completed in July 2011 using the historical data record, which EPA, METG, and GSI knew was incomplete. The GSI report was shared with key stakeholders (including the Lewis & Clark County Health Department and the Lewis & Clark County Water Quality Protection District). Subsequent to the preliminary GSI analysis, the Upper Lake Drawdown Test was initiated in the fall of 2011. In combination with the 2011 and 2012 FSAPs, the Upper Lake Drawdown Test is designed to document and quantify the hydrogeologic response of Site groundwater levels and flow rates to reduced Upper and Lower Lake recharge to Site groundwater. Additionally the Upper Lake Drawdown Test is intended to provide additional information on the overall Site hydrogeologic system in order to: quantify the Site groundwater system response to lowering of the Upper Lake water level—a significant component of the SPHC interim measure; identify potential preferential groundwater flow paths through the former smelter based on the magnitude and timing of groundwater level responses in individual wells; and refine aquifer hydraulic conductivity estimates based on the groundwater level response to dewatering in various portions of the Site. As the County knows, the test is ongoing. The data collected from the Upper Lake Drawdown Test is supplemented by over 25-years of bi-annual water levels and a variety of seasonal water level/water quality data as detailed in the 2011 and the 2012 FSAPs. These datasets include a variety of seasonal information. A technical memo summarizing the preliminary results of the Upper Lake Drawdown Test

through June 2012 is available in the Final Draft 2012 IMWP (Appendix A). The results of the Upper Lake Drawdown Test and FSAPs clearly demonstrate the benefit from the SPHC interim measure. Updated information from these data collection programs will be factored into all detailed design and performance monitoring activities.

Data gaps have been, and continue to be addressed as part of the RCRA corrective action activities at the Facility. Following implementation of the Phase II RCRA Facility Investigation (RFI) in 2010 and preparation of the draft report in 2011, METG re-examined the scope and objectives of ongoing groundwater and surface water monitoring activities at the East Helena Facility as well as adequacy of the data for developing remedial measures. This review identified gaps in the historical database, particularly with respect to groundwater and surface water. To address these data gaps, the 2011 Field Sampling and Analysis Plan (FSAP) for groundwater and surface water monitoring (METG, March 2011) was designed to: support the development of a groundwater fate and transport model; aid in identification and evaluation of potential groundwater remedial actions; and provide additional information to support development of conceptual Interim Measures and the Corrective Measures Study (CMS).[2]

2011 FSAP monitoring locations and frequency were selected on the basis of an evaluation of historic monitoring results, hydrogeologic conditions, and identified data gaps, and to address the objectives described above by evaluating the various data layers in a geographic information system. In addition to the monitoring outlined in the 2011 FSAP, a downgradient residential well monitoring program was designed and initiated in 2011, to evaluate groundwater chemistry near the currently defined leading edge of the selenium plume (i.e., in the vicinity of Canyon Ferry Road).

In summary, existing information and data is being incorporated into engineering of the proposed IMs and is of sufficient detail and duration to estimate impacts on groundwater contamination. EPA does not agree with the County's opinion that the proposed interim measures will have "questionable" benefits or success.

3. The expansion of the Prickly Pear Floodplain and Floodway are important components of the proposed IMs. We applaud this effort, although we disagree with some details. For example, the timeline for the relocation of Prickly Pear Creek to the east onto the Tertiary bench is does not allow time to properly generate a design which incorporates planning for future

[2] The general objectives outlined in the 2011 FSAP included:

- Determining the extent of offsite groundwater contamination to ensure protection of groundwater uses of potentially affected drinking water wells;
- Further developing the hydrogeologic and geochemical conceptual site model through improved understanding of temporal and spatial changes in groundwater flow directions and chemistry;
- Characterizing the geochemistry of the current groundwater plumes;
- Characterizing groundwater/surface water interactions;
- Complying with the detection monitoring requirements for CAMU 1 and 2; and
- Characterizing groundwater flow and quality near the Acid Plant Sediment Drying and Speiss-Dross slurry wall containment areas to assess their effectiveness in controlling contaminant migration.

uses, community values, sediment control with removal of the dam, appropriate reference reaches to mimic a natural stream channel to deal with the large gradient change in the areas before the railroad bridge, and potential economic opportunities (i.e. kayak park, and other recreational options). This action necessitates public involvement in the planning process and appropriate outside professional review. Many local organizations, including the Prickly Pear Land Trust, the City of East Helena and Lewis and Clark County are interested in this concept. Why are opportunities to provide restoration and redevelopment not being incorporated at this early stage?

EPA Response – The current schedule for design of the realigned PPC allows for at least one year to address the issues raised by the County. EPA believes that this lengthy period will afford interested stakeholders more than enough time to provide input into this effort. The technical team includes private and governmental experts in stream reconstruction, including the fluvial geomorphologist hired by the County to assess PPC conditions downstream of the smelter. Therefore, "outside professional review" is already occurring, and additional outside professional review paid for by the Trust is not warranted or justifiable.

EPA agrees that, wherever possible, future reuse plans should be integrated into Facility cleanup plans. For this reason, METG commissioned its redevelopment planning studies to identify potential future land uses and to integrate potential reuse plans into the corrective action decision-making process for the owned properties. However, METG lacks the resources and authority (under the Montana Settlement Agreement) to implement specific reuses. Therefore, redevelopment activities will have to be implemented by third parties from the public and/or private sectors.

EPA notes that the proposed IMs will address current safety risks on PPC such as overhanging slag and smelter dam, both of which limit safe public use and recreation opportunities in the corridor. Thus reconstruction of PPC (tentatively scheduled to occur in 2014) appears to EPA to likely greatly expand potential economic or public use opportunities in this area.

Finally, while the EPA understands the County's preference to collect additional data, perform further studies and finalize detailed plans for future land uses, the protection of public health is a higher priority for EPA. Delaying cleanup activities to address the County's preferences will not provide commensurate value or change cleanup decisions. Again, existing information is sufficient to make initial interim measure decisions.

4. Will the flood plain modeling include review and analysis of predicted sediment transport after proposed stream relocation is complete? This topic is of particular interest to the county. While the natural state of Prickly Pear Creek may be one of periodic sediment transport, Prickly Pear Creek has not been 'natural' for over 100 years. Naturalizing the creek at this point in time may represent a threat to the City of East Helena and may ultimately be a greater risk than implementing a less 'natural' alternative that includes some extension of the length of the stream with meanders, and/or some sediment 'trap'.

EPA Response – Sediment transport modeling is underway and is required for various FEMA and U.S. Army Corp permit applications. PPC currently transports sediment from sources upstream of the Facility, as well as ASARCO slag. The proposed IMs will eliminate, or greatly reduce, slag erosion into the creek. Up-stream and offsite sediment sources will continue to exist and are beyond the control and authority of EPA and METG. However, EPA does expect the design for the realignment of PPC will include a greatly expanded floodway and floodplain, additional stream meanders, and engineered sediment control structures, which should provide an improved depositional environment for sediment that does not currently exist.

5. Much of the work proposed in this work plan seems to be based on the assumption that returning the stream to something resembling its natural state is desirable, but due to decades of abuse, this section of the stream may best be handled in a different manner. Have alternate plans, such as moving the slag pile, been analyzed? Are those analyses available for public review?

   EPA Response - Conceptual evaluation and design work to date for PPC has been performed consistent with the objectives of the SPHC interim measure and consideration of Facility topography, hydraulics, flood control and sedimentation. The primary objective of the SPHC interim measure is to remove the surface water as the primary recharge source to the Facility groundwater system. Restoration of the stream to a "natural" state is not the basis for design.

   In response to the last two questions, the RCRA Corrective Action process encourages focus on protective, practical measures and does not require the evaluation of multiple alternatives. Moving the slag pile is not presently considered to be a practical interim or final corrective measure, given the massive volume of material in the slag pile (estimated to be in excess of 12 – 16 million cubic yards). However, METG continues to explore opportunities to recycle as much of the slag as possible.

6. During the excavation activities planned for the 2012 work year, what kinds of construction BMPs will be used to limit or reduce the wind-borne dust and erosion of contaminated soils? Is the safety plan available for review, and if not, can a copy of the plan be maintained in the East Helena City Hall?

   EPA Response – All construction documents will include requirements for contractor submittals addressing all necessary environmental protection, health and safety protocols and compliance with METG's site-wide Health and Safety Program (HASP). Required submittals will include detailed plans for control of erosion, stormwater, dust and any other emissions that may be associated with proposed work. METG's site-wide HASP is a living document that is continually modified to reflect new information and changes in Facility conditions as cleanup activities are performed. The HASP is available for review by any interested stakeholders; however, maintaining a current, accurate HASP at City Hall is not practical.

7. The last paragraph of section 2.1.5.1, page 2-6, states that construction of the temporary bypass will result in the excavation of approximately 260,000 cubic yards of material. The plan is to reuse this material in other IMs at the site, including the ET cover. Will this material be sampled for contaminants before and during excavation? If the material is contaminated, will it still be used in other IMs? Is there a trigger level at which the materials would be rejected for reuse?

   EPA Response – The by-pass corridor has been sampled and results show elevated soil contaminants within the first few inches of soil. Additional sampling and analysis will be performed as necessary to ensure that the work is performed in a manner that is protective of human health and that excavated materials are managed appropriately. Because all of the work associated with the SPHC IM is being done within the Area of Contamination (AOC) designated by EPA, the excavated materials are considered remediation waste and can be consolidated within the AOC boundaries. All soils placed on site will also be within the footprint of the ET Cover System. The ET Cover System will have a surface layer, which will consist of clean soils/growth media, to prevent potential exposure to surface contaminants and control infiltration of precipitation (and therefore the potential for contaminants to leach to groundwater).

8. Section 2.1.5.2, last paragraph, notes that construction is expected to result in the excavation of 250,000 to 300,000 cubic yards of material which will be reused on site. As with #7 above, will sampling be conducted and appropriate disposition of soil be made based on sampling results?

   EPA Response - Please see the response to Comment 7 above.

9. From the document, it appears that approximately 510,000 to 560,000 cubic yards of materials will be excavated for reuse, and an additional 600,000 will be imported from offsite sources. Are there plans to treat potentially contaminated onsite soils by mixing with offsite soils, thereby diluting contamination levels?

   EPA Response – No, there are no plans to mix soils on the Smelter Site with imported, off-site soils. Materials to be imported from off-site will be used to construct the ET Cover System, in order to provide a "clean" surface that is protective for both human and ecological receptors. The imported materials will be placed over the top of the soils to be excavated during IM implementation and moved onto the former Smelter Site within the footprint of the ET Cover System.

10. Has the area designated as the site of the Prickly Pear Creek bypass and new stream channel been evaluated with soil test pits and sampling? Have soil profiles been established, and depths of reusable soil been established?

    EPA Response – METG collected samples from borings, piezometers, and test pits installed in the east tertiary bench early this year. Collection of additional samples is currently being

evaluated. As noted above, EPA and METG expect to reuse all excavated soils for construction of the ET Cover System.

11. The proposal to use an ET cover system is laudable. The addition of a geosynthetic membrane for use in areas of high contamination levels, such as the CAMUs, would add an extra level of protection. Has this been considered, and if so, what conclusion was reached?

    EPA Response – EPA appreciates the acknowledgement of the appropriateness of the ET Cover System. EPA, METG, and MDEQ have had discussions on design criteria for the ET Cover System. EPA will review and approve the design documents for the ET Cover System. Installation of the ET Cover System is scheduled for 2014 and therefore design details will be provided in the 2014 IMWP, which will be issued for public review and comment prior to being finalized and approved by EPA.

12. Approximately 500,000 cubic yards of soil is proposed to be reused from the construction of the creek bypass and new stream channel. If the soils are inadequate in type or volume for this use has an alternate source of soil been identified, in additional to the 600,000 cubic yards you are proposing to bring in from Valley View Landfill? While large volumes of 'materials' are scheduled to be excavated onsite, that doesn't necessarily indicate they are appropriate for use in the ET cover. Additionally, screening the soil and construction techniques can damage soil structure, making it unsuitable for some purposes. Has this been taken into consideration? It seems appropriate that more information about soils be collected and shared with the public prior to finalizing the plan to reuse onsite soils for an ET cover.

    EPA Response - Material specifications will be developed during final design of the IMs to describe the key physical, geotechnical and environmental quality parameters. The designers recognize that the physical parameters of soils can change when soils are disturbed, when moisture contents change, etc., which will also be factored into the final designs. Material characteristics will be specified according to the use of the material, and sampling protocols will be developed to define the information necessary to demonstrate that the specifications are met. As stated in the response to 12 above, detailed information about the ET Cover System design will be included in the 2014 IMWP.

13. What is the final CAMU Rule, mentioned in Section 2.2.3? Where can the rule be read?

    EPA Response – The final CAMU Rule, as amended, can be found on EPA's website at: http://www.epa.gov/fedrgstr/EPA-WASTE/2002/January/Day-22/f0004.htm.

14. Section 2.2.4, the first bullet item, states, "Vegetated Layer (8 inches) – Select fill with minimum with organics, …." The sentence does not make sense.

    EPA Response – METG, please revise this sentence to clarify that there will be a requirement for a minimum percentage of organic material to support vegetation in the layer.

15. Does the term, 'select fill', used in Section 2.2.4, have a definition? If so, please provide it.

EPA Response - METG, please add a definition of "select fill" to clarify the requirements for the materials in the vegetated layer and ET layer.

16. Section 2.3.2 describes plans to conduct source removal and interment of excavated materials into CAMU 3. We support this removal and placement of the soils into a CAMU, although we question the location of CAMU #3 in the LOSA, where it will be in closer proximity to groundwater.

    EPA Response - The depth to groundwater in the proposed location for CAMU 3 (the Lower Ore Storage Area or the LOSA), is similar to the depth measured in the vicinity of the existing CAMUs. Figure 5-6c of the draft Phase II RFI shows depth to groundwater in the vicinity of CAMU's 1 and 2 at approximately 30 - 35 feet (as measured at MWs 2 and 3). Figure 5-6b of the draft Phase II RFI indicates that groundwater in the vicinity of the LOSA is between 30 and 40 feet below the existing ground surface (as measured at points DH-61, DH-62 and DH- 8). An analysis of the siting criteria for CAMU 3 will be included in the draft 2013 IMWP.

17. Section 2.3.4 discusses the plans to remove potentially saturated soils from Lower Lake and Tito Park. Are there plans to drain or dry soils prior to interment into a CAMU?

    EPA Response – Under the sequenced implementation plans for the interim measures, Lower Lake and Tito Park will be de-watered by routing the southern section of PPC through the temporary by-pass channel away from Lower Lake and Tito Park. Soils and sediments will be excavated and placed in the third CAMU after dewatering.

18. The Wilson Ditch/pipe runs along the area proposed for the CAMU unit and ET cover system. Will there be a setback between the CAMU and ET cover and the ditch/pipe, or will the ditch/pipe be moved to a new location?

    EPA Response – The Wilson Ditch pipe is located outside the footprint of the proposed CAMU. That said, plans call for abandoning Wilson Ditch, which supplies irrigation water to Burnham Ranch. The current point of diversion at Upper Lake must be relocated because Upper Lake will no longer store water under SPHC interim measure. Burnham's water rights are to PPC. EPA and METG are discussing relocation of the point of diversion with the Burnham's.

19. Page 5-3 Section 5.1.2.2 – The first two bullet items use acronyms that are not listed in the Acronyms and Abbreviations page. They are HSP and ACM. Please provide a definition.

    EPA Response - METG, please define the above acronyms and add them to the Acronyms and Abbreviations page.

20. Section 6, page 6-1, last paragraph, notes that areas of continuous contamination meeting the definition of a RCRA facility extend beyond the proposed AOC boundary. Why has the AOC

boundary been shrunk to exclude the areas that soils with potential lead concentrations of 1,000 mg/kg and potential arsenic concentrations of 100 mg/kg? The exclusion of this area contradicts the AOC policy as presented in Section 6.1. We disagree that the AOC boundary should be reduced in this manner.

EPA Response – The AOC boundary was established to encompass the properties subject to RCRA Corrective Action per the requirements of Paragraph 38 of the First Modification to the Consent Decree (with the exception of the rodeo grounds). Paragraph 38 of the First Modification requires that the CMS address all American Smelting and Refining Company (ASARCO) Properties, including areas where contamination has migrated. Paragraph 38 states *"… final agency decisions on remedies for those properties designated … by the numbers 10, 11, 12, 15, 16, 17, 18, 19, 23, and the portions of 2 near Prickly Pear Creek, shall be made by USEPA after completion of the investigations and studies set forth in this Decree…."* (the CMS Parcels). The parcels referred to in Paragraph 38 are shown in Figure 6-1 of the 2012 IMWP. Pursuant to the RCRA Consent Decree, the areas that fall outside of the proposed AOC boundary, but within the potential soil lead concentration line of 1,000 mg/kg and potential soil arsenic concentration line of 100 mg/kg (as defined in the OU-2 ROD) are being addressed under CERCLA and therefore are not included in within the proposed AOC boundary.

21. The basis for determinations on the AOC in Section 6 is information from the Phase II RFI. Page 6-1, last paragraph states, "Further, as can be seen in Section 6 of the draft Phase II RFI, more recent sampling confirms the presence of constituents of concern (COCs)…." Using the draft RFI with questionable data seems imprudent. Sampling of the area should be conducted prior to making a decision on what area should and should not be considered part of the facility. Rationale for the selected area appears arbitrary. Based on Figures 5-3 and 5-4 of the ROD, the area should be larger.

    EPA Response – Please refer to the response to comment 20 above. The rationale for the boundary of the AOC was not arbitrary; rather it was selected based: on the boundaries of properties subject to RCRA Corrective Action per the First Modification to the Consent Decree; and the continuous area of contamination for the management of RCRA remediation waste associated with cleanup of the East Helena Facility. The proposed AOC boundary meets the intent of the AOC policy as well as the definition of an AOC. EPA does not believe that the data identified in Section 6 is "questionable".

22. Are only Trust lands considered for inclusion in the RCRA facility AOC? If slag is encountered on other property in Prickly Pear Creek, will that property become part of the RCRA clean up?

    EPA Response – See the response to comment 20 above regarding how the AOC boundaries were established. Regardless of the AOC boundaries, the First Modification to the 1998 Consent Decree also indicates that corrective measures activities under RCRA shall also be conducted on properties including areas where contamination has migrated. Therefore, if slag is encountered on other property and if that slag is found to pose an unacceptable risk to

human health or the environment, it can be part of the RCRA cleanup but is not currently part of the proposed IMs.

23. The text in Section 6.2.4 notes that during building demolition, materials will be recycled as appropriate. We support this action.

    EPA Response – EPA appreciates your support.

24. Table 8-2 indicated that the public comment period for the interim measures work plan is through August 1, 2012. That error should be corrected in the final document.

    EPA Response – EPA agrees. METG, please revise the date the public comment period for the interim measures work plan ended to July 16, 2012.

25. Section 8.4.2 notes that work began on the Prickly Pear Creek temporary bypass in April of 2012. This action is of significant interest to the county and to the public. It seems to be reducing the opportunity for public input to a level that is not timely or meaningful. The concept design is noted as being essentially complete, and again, seems to make any public comment meaningless. Public input on the plans for the site should be heard prior to work beginning.

    EPA Response – The preliminary work referred to in Section 8.4.2 encompasses preliminary conceptual design to support initial preparation of the permit applications required to implement the bypass channel. EPA and METG have been discussing bypass channel permit requirements with the multitude of federal, state and local regulatory agencies involved in permitting the bypass channel, including the City of East Helena, Montana Department of Natural Resources and Conservation (DNRC), FEMA, and the US Army Corps of Engineers. Due to the complexity and timeframe for permitting the bypass channel, EPA and METG initiated these activities earlier this year.

    There are opportunities for comment during the natural resource permitting process. Construction of the bypass channel is scheduled for 2013 and therefore design information for the channel will be included in the 2013 IMWP. The 2013 IMWP will be issued for public review and comment later this year or early next year. Therefore, the County's contention that "public comment is meaningless" is both inaccurate and inappropriate, given forthcoming opportunities for public input. EPA also notes that the bypass channel is temporary and will be replaced by the realigned PPC in 2014 and/or 2015.

26. While these measures are only interim, they also commit EPA and the METG to a course of action that is hard to change in the future. Certainty now can reduce long term costs. While both EPA and the METG have expressed a commitment to moving forward with the cleanup, we feel that there sufficient questions and data gaps that work should be postponed for 6-9 months to provide time for collection of adequate groundwater level data for at least a 12-month period, and more opportunity for public input into the proposed actions, as noted in #25 above. Further we believe that as changes to Prickly Pear Creek occur, recreation and

redevelop should be incorporated into the project design and Work Plan. We hope that EPA will consider a modification of the Work Plan to incorporate such changes.

EPA Response – EPA appreciates the County's questions and concerns and offers the following responses to the above issues.

Regarding the County's concerns about the adequacy of data, EPA directs the County to EPA's response to comment 2 from the WQPD. As stated there, the results of the Upper Lake Drawdown Test and FSAPs clearly demonstrate the expected benefit from SPHC interim measure. Updated information from these data collection programs with be included in the draft 2013 Interim Measure Work Plan and factored into all detailed design and performance monitoring activities.

In response to the issue of public input, EPA refers the County to the EPA's general responses to comments from the WQPD regarding RCRA Public Participation, Interim Measures Under RCRA and Timing for Interim Measures.

EPA's response to comment #3 addresses the realigned PPC schedule, design team and potential reuse plans.

The approach to review and approve the annual IMWPs is an iterative process and incorporates a number of levels of review by the regulatory agencies and the public. EPA's conceptual approval of the three proposed interim measures and formal approval of the work slated for 2012 at this time is appropriate and justified.

Thank you again for the opportunity to provide comment on this important project. We appreciate the hard work and commitment you have demonstrated in your efforts to identify and implement effective cleanup strategies for this very difficult site.

Sincerely,

via email

Kathy Moore, R.S.
Environmental Services Administrator
Lewis and Clark City-County Health Department

Cc: Melanie Reynolds, L&C County Health Officer
Lewis and Clark County Administrative Officer

8/27/2012 - EPA RESPONSE TO STATE OF MONTANA COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – CONCEPTUAL OVERVIEW OF THE PROPOSED INTERIM MEASURES AND DETAILS OF 2012 ACTIVITIES,* SUBMITTED ON 7/16/2012.

July 16, 2012

Betsy Burns
Remedial Project Manager
US Environmental Protection Agency
1OW 15th Street, Suite 3200
Helena, MT 59601

RE: Comments on IM Work Plan- Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities

Dear Ms. Burns:

The State of Montana, through the Montana Department of Justice and Department of Environmental Quality, is submitting the following comments on the Former ASARCO East Helena Facility Interim Measures Work Plan- Conceptual Overview of Proposed Interim and Details of 2012 Activities (IM Work Plan), submitted by the Montana Environmental Trust Group, dated June 2012. EPA has solicited comments on the proposed interim measures.

1. Inadequacy of Interim Measures process. The IM Work Plan states, "The purpose of this Interim Measures Work Plan .. .is to provide information to support U.S. Environmental Protection Agency ... conceptual approval of three interim measures ... proposed for the East Helena Facility ... " (emphasis added). In the Interim Measures Work Plan, site-specific design information and performance standards are limited or not included for the interim measures. The State of Montana maintains that due to the breath of the proposed corrective action alternatives, these alternatives are best managed through a conventional RCRA Corrective Measures Study. The IM Work Plan states, "The IMs will be evaluated as part of the Corrective Measures Study (CMS) process to determine whether they satisfy the remedial action objectives and remedy evaluation criteria for final remedies at the Facility or whether additional measures will be needed." The State is concerned that the IM implementation schedule set forth in the IM Work Plan will lead to a CMS analysis that is non-substantive in nature, as the IMs will already be implemented by that time, and are of a permanent nature. For example, the State believes further details and analysis are necessary for the nearly sitewide ET Cover System IM and the Source Removal IM, including the CAMU #3 and the proposed location at the Lower Ore Storage Area (LOSA), presently presented as conceptual interim measures. The State maintains that a CMS should be developed now, which analyzes the RCRA alternatives. EPA instead proposes a 2015 CMS schedule.

   EPA Response - EPA appreciates the State's comprehensive review and comments on the Final Draft 2012 Interim Measures (IMs) Work Plan and the State's tentative, general

support (verbalized at Beneficiary technical meetings in February and March 2012) for the IMs proposed for implementation in 2012. EPA also understands that the State would prefer to see all IMs delayed until completion of the Corrective Measures Study (CMS). EPA agrees that the CMS will provide critical information about remedy performance for all interim and final corrective measures for the Facility, including those performed by Asarco. Section VI.12 of the First Modification to the 1998 RCRA Consent Decree (the First Mod), however, states that ***"Interim measures, in addition to those which may already be in place, shall be used whenever possible and appropriate to achieve the goal of stabilization, which is defined to mean the control or abatement of imminent threats to human health and/or the environment (including, without limitation, actions in support of an interim measure), and prevention or minimization of the spread of hazardous waste or hazardous constituents while long-term corrective measure alternatives are being evaluated."*** METG has proposed that the IMs described in the 2012 IMWP be implemented while the CMS is being developed. Based on the totality of information available for the site EPA, believes that the proposed IMs are more likely than not to help METG achieve stabilization at the facility. EPA therefore disagrees with the State that METG should not pursue IMs pending completion of the CMS.

Regarding the State's concerns about the lack of details on the proposed IMs, EPA reminds the State that the 2012 IMWP is not intended to include the detailed design and analysis of IMs that will be performed after 2012. Detailed information on analysis and design will be included in each of the IMWPs that will be prepared and submitted for IMs to be performed in 2013, 2014 and 2015 and later, if required. As with this work plan, the State will have the opportunity to provide public comment on each work plan for consideration by EPA and METG. EPA also remains fully committed to continuing to share details with the State as soon as practicable. One example of this commitment is that during the first week of August, the State was involved in technical discussions with the EPA and METG where details and design information on components of the ET Cover System IM and the Source Removal IM that will be presented in the 2013 IMWP were shared by METG.

Finally, EPA and METG began discussing the 2012 IMs with the State and the rest of the public as early as July 2011. EPA has honored its commitment and responsibility to consult with the State regarding work at the East Helena designated property and will continue to do so.

The State believes there is currently insufficient information to support locating the CAMU at the LOSA, given that the design, construction, and post-closure care requirements have not been provided. The State believes it is the best interest of the project to have a deliberative evaluation of the proposed landfill location, landfill design, and of the soils to be removed and placed in a landfill. This type of evaluation is commonly included in a RCRA CMS.

EPA Response – EPA and METG have had discussions as well as formal and informal technical reviews with Montana Department of Environmental Quality (MDEQ) regarding the design criteria, specifications and location of the third CAMU. EPA understands that MDEQ supports the CAMU specifications and design criteria, and location of the third

CAMU. EPA and METG have and will continue to perform the deliberative evaluations regarding the third CAMU, including the results of CAMU studies and conceptual and detailed design packages. Final design, including CAMU siting criteria and design specifications will be provided in the 2013 IMWP.

2. Delineation of RCRA Area of Contamination. The State strongly disagrees with METG's delineation of the RCRA Area of Contamination (RCRA AOC). Such an expansive RCRA AOC goes well beyond what would be permitted by the State within the State of Montana through its RCRA Corrective Action program. The justifications provided in the IM Work Plan for this expansive RCRA AOC are neither logical nor appropriate. The State will continue to advocate that the RCRA AOC remain the smelter facility boundary.

   EPA Response – EPA appreciates that the State may interpret EPA's policy on AOCs differently than EPA would. The proposed AOC boundary, however, meets the intent of the agency's AOC policy as well as the definition of an AOC.

3. Background levels. The State disagrees with METG's use of 0.017 mg/1 for the background level of arsenic, as set forth in Figures 3-8 and 3-9. Background is much lower, as demonstrated by the figures themselves, and other data the State has shared with METG.

   EPA Response – EPA understands the State's concerns regarding background levels of Arsenic and is therefore requesting that METG remove the references to regional background level for Arsenic, including Figures 3-8 and 3-9.

4. PCB disposal. The IM Work Plan states that PCB contaminated materials will be placed in the CAMU or transported to an appropriately permitted offsite landfill. The State recommends to EPA that PCB contaminated material be shipped off-site for disposal. The State maintains its concern that onsite PCB disposal may complicate any future corrective action if the CAMU #3 fails and may increase the long-term monitoring cost of CAMU #3.

   EPA Response – EPA agrees with the State's concerns and is therefore requesting that METG modify Section 6 of the IMWP to state that PCB waste will be taken to an appropriately permitted off-site facility for disposal.

5. Corrective Action Plan requirements. Paragraph 14 of the 2012 RCRA Consent Decree requires that the IM work plan be "no less comprehensive than the IM Work Plan described in the [Corrective Action Plan]." Required sections of the Corrective Action Plan (CAP) IM Work Plan, found in CAP, Appendix E, include the following sections: an evaluation of interim measure alternatives (#3), which should list, describe, and evaluate, interim measure alternatives that have the potential to stabilize the facility, among other requirements; design basis (#8), site plan showing preliminary plant layout and/or treatment area (#I 0); tables listing number and type of major components with approximate dimensions (#11), and tables giving preliminary mass balance (#12). In addition, the State believes the 2012 work plan does not adequately include the following elements, based on the CAP language: description

of interim measures (#4) and data sufficiency (#5). Please add these sections to the work plan.

EPA Response - The CAP, including appendices, is designed to ensure that appropriate inquiry is made and adequate data and other appropriate support is provided for any proposed activity. The CAP is also clear in multiple locations that there is site-specific flexibility to draft work plans that are appropriate for site-specific circumstances. Under these site-specific circumstances, EPA determined that not every element of a model work plan must be included in this work plan. EPA believes that requiring the Trust to add the suggested elements to the IM Work Plan would not add value, and would add cost.

6. Discovery of unusual materials or substances. The IM Work Plan states that if unusual materials or substances are encountered, it will either be sampled to identify the material and make an appropriately protective management decision, or it will be placed in the CAMU. The State recommends that any unusual materials or substances be characterized prior to disposal in the CAMU #3 to protect the CAMU liner system, to prevent additional postclosure monitoring costs, and to prevent additional cost in future CAMU #3 corrective action, if necessary.

   EPA Response – EPA disagrees. Unusual materials or substances will be managed, including appropriate sampling and disposal, consistent with EPA policy and guidance, including the AOC policy, as well as best practices to protect the integrity of the cell.

7. Lower Ore Storage Area design, monitoring, and performance standards. The State maintains that the IM Work Plan should provide information on how success of the SPHC IM will be measured. The IM Work Plan should include preliminary monitoring plans.

   EPA Response – Specific performance criteria and metrics are being developed for all of the proposed IMs. This information will be documented separately in a site-wide monitoring plan. Performance criteria and metrics for individual IM elements will be outlined in the appropriate, applicable future IM Work Plan. Performance criteria for IM tasks planned for 2012 are not applicable and therefore are not included in the Draft 2012 IMWP.

8. ET Cover System design, monitoring, and performance standards. Site specific design and performance standards for the ET Cover System IM were not included in the IM Work Plan. Capping may be presented as an interim measure, but the expectation of the IM Work Plan is that it will likely become a large portion of the site's final remedy. Therefore, the State maintains site-specific design information and performance standards should be included in a document available for public review and comment.

   EPA Response - EPA disagrees that site-specific design information and performance standards are necessary for conceptual approval of the IMs. Site specific design and performance standards for the ET Cover System will be included in the draft IMWP for the year that the ET Cover System will be installed (currently projected for 2014). Final design documents will be made available to the State for review and comment. Additionally, ET

Cover System design information also will be included in the CAMU application package to EPA. As discussed above, EPA will review the CAMU application, and will make sure that there will be extensive opportunity for input from the State.

9. CAMU design, monitoring, and performance standards. Site-specific design and post-closure monitoring requirements for the CAMU were not including in the IM Work Plan. Construction of a RCRA landfill is a permanent corrective action. The State maintains design information, performance standards, and a long-term monitoring plan must be included in a document that is available for public review and comment.

   EPA Response - EPA disagrees. The two previous CAMUs were constructed as IMs and design summaries were documented in the IMWPs. Further, site-specific design and regulatory post closure monitoring requirements were not included in the Asarco-prepared IMWPs. Similar to the 2012 IMWP, the previous IMWPs were made available for public review and comment. As noted above, METG will submit an application package with the CAMU design, monitoring and performance standards. As discussed above, EPA will review the CAMU application, and will ensure there is ample opportunity for input from the State.

10. Cost information. The State maintains that the public should have been informed of the estimated costs of the proposed interim measures in the IM Work Plan, as this could have significantly influenced public comment.

    EPA Response - EPA disagrees. Cost information is not properly or appropriately included in a RCRA corrective action IMWP. Including such cost information would inaccurately suggest that EPA is seeking public comment on the estimated costs for the IMs.

11. Referenced draft Phase II RFI Report. It should be made clear that the Phase II RFI Report remains in draft, and will be released at a later date.

    EPA Response - EPA agrees and believes that it was clearly presented that the Phase II RFI is a draft document. The EPA expects the Phase II RFI to be finalized in the near future.

12. References. The IM Work Plan should include a reference section.

    EPA Response - EPA disagrees. References are clearly discussed with each Section of the IM WP and identified on tables and figures. A reference section can be added to the 2013 Interim Measure Work Plan.

Thank you for your consideration.

Sincerely,
Robert G. Collins
Supervising Assistant Attorney General

cc: Denise A. Kirkpatrick, Montana Department of Environmental Quality
Cynthia Brooks, Montana Environmental Trust Group LLC, PO Box 1230, East Helena, Montana 59635